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LEON M. ESTABROOK, Chief

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HONEYBEES AND HONEY PRODUCTION IN THE UNITED STATES.

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THE honeybee is the primary conservationist. Supplementing its extremely important service of promoting the pollination of important food and feed crops, it elaborates from the nectar of the plants thus benefited one of the most delicious, nutritious and readily digestible of all foods. The fact that the most important work of the honey bee is not the production of honey, but the carrying of pollen from flower to flower, thus assisting in the fertilization of plants and assuring their fruitfulness, is not always appreciated. Growers of early cucumbers under glass find it necessary to install hives of bees in their hothouses to insure their crop. A rainy, cold spell during fruit bloom, keeping bees from flying, results in little fruit that season. Many people are not aware that they are thus dependent largely upon these busy and sometimes intrusive insects for the fruitfulness of their orchards and gardens. The work of the bees is important not only to the production of tree fruits, but to

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full seed or fruit production of a number of forages and grains, berries, and vining plants such as the squash and its relatives, not to mention many ornamental plants and trees. Many other varieties of bees than the honey producing kind and a multitude of other insects assist in the work of transferring pollen from plant to plant, but the honeybee is probably the most important single agent, certainly so in the case of fruit trees.

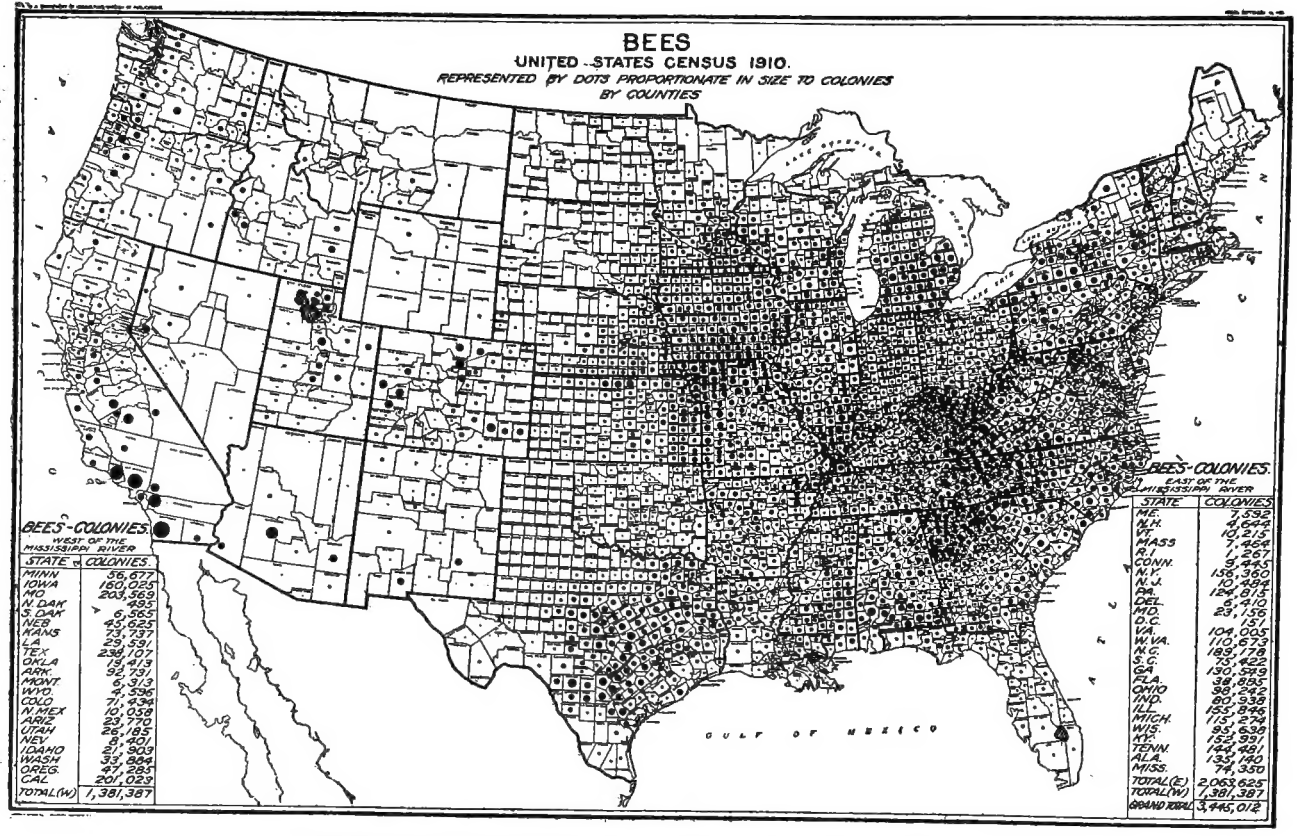
MAP INDICATING DISTRIBUTION OF BEES.

The map printed herewith, showing the distribution of bees in the United States according to the 1910 census, indicates within reasonable limits where bees are most numerous, but some features require a brief explanation. The map shows only bees owned and reported by farmers, omitting the great number of colonies kept in towns or in outapiaries by professional beekeepers, thus making a relatively heavy showing in the more purely rural portions of the country.

The large number of bees indicated in the Southeastern States and particularly in the Appalachian section, while reflecting an undoubted fact, carries an impression stronger than the facts warrant, partially because the territory is predominantly rural, but more because in that region the colonies are, to a greater extent than elsewhere, kept in small boxes, kegs, and similar receptacles which limit the size of the colony and cause heavy swarming. This latter fact tended to further exaggeration because at the time the census was taken swarming was well advanced in the South though hardly begun in the North.

The great importance of beekeeping in the sage and orange sections of southwestern California, the alfalfa and sweet-clover sections of other Western States, the clover belt of the North Central and Northeastern States, in the cotton, horse-mint, and desert plant sections of Texas and in the belt of tupelo and mixed bloom of the coastal plains adjoining the south Atlantic and Gulf coast, are all readily observable.

The great development in certain regions subsequent to the census, as in the Imperial Valley of California (the southeastern section of the State), in southern Idaho (Twin Falls region), and elsewhere, is, of course, not indicated.



MAP SHOWING DENSITY OF BEE CULTURE IN THE UNITED STATES.

EXTENT OF INDUSTRY.

The importance of the honey industry in the United States is realized by few, even of those who have given some attention to the subject, owing to the fact that the census figures, which are naturally looked to for information, report only concerning the bees belonging to farmers, whereas a large and increasing proportion of the honeybees of the country, producing a still larger proportion of the honey crop, belong to beekeepers other than farmers and are located in villages and towns, or, by permission of the farmer or landowner, are kept in out-of-the-way places on farms or hidden in the recesses of the hills, away from frequented roads where they would be readily observed. Surveys of the beekeeping industry in Massachusetts and Indiana indicate that the census included hardly more than half the actual number of colonies of bees in those States and checks on honey production show similar deficiencies in other States.

The census reports indicate for 1910 a total of 3,445,006 colonies, which, if accepted as representing the number on farms, though it is certain that not all such were recorded, may be taken to indicate in the hands of farmers and all others certainly not less than 5,000,000 colonies, more probably 6,000,000, and possibly more. Leading commercial honey authorities estimate the number to be much higher.

The production of honey in 1909, according to the same authority, was approximately 55,000,000 pounds. That this is far below the facts is certain. The average yields indicated by the census reports are about 16 pounds in 1909 and about 15 pounds in 1900, whereas the average yields as reported to the Bureau of Crop Estimates by honey producers are about 40 pounds per colony. Only a little over half the farms reporting bees gave any figures on honey production to the census enumerators. The proportion that actually produced no honey is unknown, but the actual yields per colony on farms must have been considerably higher than those indicated by these imperfect returns to the census enumerators. The honey producers' reports are more nearly representative of the commercial producer, who often, and probably as a rule, is not a farmer, and it may be safely assumed that the average production per colony of bees not belonging to farmers is considerably

higher than of those belonging to farmers. If the most probable figure mentioned, 6,000,000 colonies, be accepted as representing all colonies of bees in the United States and the average yield be considered as 25 pounds, which appears conservative, this would account for a total production of 150,000,000 pounds of honey.

An inquiry of leading manufacturers of beekeepers' supplies concerning sales of 1-pound sections, with a conservative allowance for those produced by small firms and individuals, indicates for the season of 1917 a total of about 55,000,000 such sections, and for 1916 and 1915 about 53,000,000 and 45,000,000 sections, respectively. If we accept the common assumption of 1 pound per section, and allow 5 per cent for wastage of empty sections, this would indicate a production of about 52,000,000 pounds of comb honey in 1917. Reports to the Bureau of Crop Estimates from a list of over 5,000 honey producers indicate that the proportion of comb honey in 1-pound sections to all honey obtained from the bees is about 38 per cent. While this figure reflects the facts for the men reporting to the bureau, it is known to be too high if applied to all honey produced, especially in many Southeastern States, where a true return for all beekeepers would show much higher figures for "chunk" honey and lower for comb as well as extracted. A figure for the United States of 33 per cent of comb would be nearer the truth. If this figure be applied to the indicated production of comb honey, it would point to a total production of about 158,000,000 pounds. Commercial honey handlers consider that the proportion of comb honey is much lower, which, if true, would mean a corresponding increase in the indicated total production. The leading commercial authorities in the United States on honeybees and honey production estimate that the total production is considerably in excess of 200,000,000 pounds.

DEPENDABILITY OF TABLES.

In presenting the material appearing in the following tables it should be stated that so much of these data as are drawn from the reports to the Bureau of Crop Estimates by its list of honey producers are of varying degrees of dependability, according to whether the cooperation in the

different States has been full or incomplete. For most of the States data are fairly complete, and for the important producing States of California, Texas, Colorado, all of the North Central group except North Dakota and most of the Central Atlantic and North Atlantic groups they are good, particularly for the years 1916 and 1917. From the States of New Hampshire, Rhode Island, Delaware, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Louisiana, Kentucky, North Dakota, Wyoming, New Mexico, Arizona, Utah, Nevada, Washington, and Oregon responses have been relatively few and the figures given are therefore to be accepted with reserve.

TABLE I.—*Honeybees in the United States.*

State.	Number of colonies of bees on farms (United States census).		Spring count of colonies, year stated, in per cent of previous year. (Report May 1.)					
	June 1, 1900.	Apr. 15, 1910.	1914 compared with the usual number in previous years.	1914 compared with 1913.	1915 compared with 1914.	1916 compared with 1915.	1917 compared with 1916.	1918 compared with 1917.
	Number.	*Number.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Maine	10,857	7,592	98	99	100	107	106	85
New Hampshire	5,520	4,644	94	96	103	100	115	85
Vermont	12,836	10,215	98	98	96	115	105	75
Massachusetts	8,381	7,464	95	96	101	115	106	70
Rhode Island	1,681	1,267	99	99	100	105	105	95
Connecticut	11,438	9,445	85	92	110	85	112	75
New York	187,208	156,360	102	103	90	109	110	80
New Jersey	14,118	10,484	100	103	98	90	106	73
Pennsylvania	161,670	124,815	95	98	96	100	110	65
Delaware	10,187	6,410	100	101	98	103	95	85
Maryland	28,013	23,156	96	100	102	97	108	70
District of Columbia	59	151	.....	.....	.....	.....	.....	.....
Virginia	139,064	104,005	98	100	106	100	100	77
West Virginia	111,417	110,673	99	101	95	102	100	75
North Carolina	244,539	189,178	101	103	102	94	96	88
South Carolina	93,958	75,422	100	100	101	100	100	115
Georgia	187,919	130,549	95	98	100	98	110	110
Florida	39,753	38,895	101	103	100	100	96	115
Ohio	151,391	98,242	105	108	98	98	108	65
Indiana	117,148	80,938	110	115	90	102	112	70
Illinois	179,953	155,846	97	100	92	105	118	80

TABLE I.—*Honeybees in the United States*—Continued.

State.	Number of colonies of bees on farms (United States census).		Spring count of colonies, year stated, in per cent of previous year. (Report May 1.)					
	June 1, 1900.	Apr. 15, 1910.	1914 compared with the usual number in previous years.	1914 compared with 1913.	1915 compared with 1914.	1916 compared with 1915.	1917 compared with 1916.	1918 compared with 1917.
	Number.	*Number.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Michigan	100,397	115,274	101	103	104	98	106	80
Wisconsin	106,090	95,638	100	105	103	101	103	96
Minnesota	45,877	56,677	100	105	102	115	96	108
Iowa	138,811	160,025	105	115	94	117	105	85
Missouri	205,110	203,569	90	93	86	115	112	83
North Dakota	279	495	110	105	105	120	125	120
South Dakota	2,063	6,565	105	115	105	120	95	95
Nebraska	52,143	45,625	95	97	92	150	112	93
Kansas	88,594	73,737	85	90	100	108	108	96
Kentucky	203,820	152,991	115	110	102	105	107	70
Tennessee	225,788	144,481	100	115	102	80	108	88
Alabama	205,369	135,140	105	105	101	105	106	115
Mississippi	95,257	74,350	94	95	100	103	92	96
Louisiana	35,231	29,591	93	96	96	105	106	115
Texas	392,644	238,107	115	112	115	94	95	74
Oklahoma	[1] 20,137	19,413	107	110	99	103	109	100
Arkansas	111,138	92,731	99	100	92	102	88	105
Montana	1,801	6,313	120	110	125	112	88	125
Wyoming	1,020	4,596	106	110	120	112	112	125
Colorado	59,756	71,434	115	120	101	103	100	107
New Mexico	6,164	10,052	110	115	115	108	103	98
Arizona	18,991	23,770	115	110	110	108	96	100
Utah	33,818	26,185	110	105	105	98	80	112
Nevada	5,692	8,401	110	105	100	105	75	112
Idaho	19,240	21,903	150	130	105	115	60	135
Washington	30,870	33,884	108	105	103	100	110	115
Oregon	55,585	47,285	110	108	98	95	95	105
California	129,444	201,023	85	93	110	104	92	95
United States	4,108,239	3,445,008	100.4	104.2	101.4	102.9	101.5	88.7

[1] Includes Indian Territory.

COLONIES OF BEES IN THE UNITED STATES.

The first census to make inquiry concerning the number of colonies of bees on farms in the United States was the twelfth, which reports the number of colonies belonging to farmers on June 1, 1900, to be 4,108,239. The next census (1910) reported 3,445,006 on hand as of April 15, 1910, but the last showing is unfairly low even compared with the first, because the date of the last census is 45 days earlier than the former and at a period of the year when the number of colonies is increasing rapidly from swarming. Making allowance for this difference, the number in 1910 should perhaps have been about 3,700,000 colonies. It seems unquestionable that the number of colonies of bees in the hands of farmers did actually decline in the intervening 10 years, which had not been as a rule favorable for honey production and had also been marked by considerable losses of bees from diseases of the brood, which often destroyed whole apiaries, containing sometimes hundreds of colonies. The period of the Nineties preceding the census of 1900 had, to the contrary, been favorable for bees, aside from disease in some sections. However, the report of the 1910 census represents more nearly than the former one the customary basis of number of colonies as recognized by bee keepers, namely, the spring count, i. e., the number of working colonies of bees remaining on hand (excluding new swarms of the current year), at about the settled beginning of the spring nectar flow, which, for the country at large, would average about May 1.

The changes in numbers of bees since 1910 may be followed in a general way by a study of the percentages of increase shown in connection with the census figures just quoted in Table I. The bureau's first inquiry, made on May 1, 1914, asked concerning the number of colonies compared with the usual. The usual, being the average of the preceding few years, would represent figures in all probability very close to those of the census year 1910. The responses indicated an increase over the usual of 0.4 per cent and an increase over 1913 of over 4 per cent, which would point to a small decline subsequent to 1910, before the beginning in 1914 of the upward trend which has been

observed in each succeeding year. The total increase since 1910 to the spring of 1917 appears to be not far from 10 per cent. This growth has been largely within the ranks of the professional honey producers, those making this a principal business, rather than among the farmer beekeepers, not fully represented in this estimate, who, for reasons mentioned later, quite possibly have less rather than more bees, certainly so in many sections where bee diseases have invaded new territory.

TABLE II.—*Honeybees: Per cent of total swarming, by months.*

State.	Proportion of total annual increase of colonies in—					
	March.	April.	May.	June.	July.	August.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Maine	.....	.....	7.3	50.1	38.7	3.9
New Hampshire	.....	.....	9.7	48.5	28.3	13.5
Vermont	.....	.....	5.8	59.2	31.3	3.7
Massachusetts	.....	1.4	20.8	47.1	21.2	9.5
Rhode Island	.....	.....	5.0	80.0	15.0	.....
Connecticut	.....	.5	25.4	49.7	21.7	2.7
New York	.....	.....	9.5	54.4	28.5	7.6
New Jersey	.....	1.0	29.4	48.5	11.8	9.3
Pennsylvania	.....	.7	19.7	58.3	15.8	5.5
Delaware	.....	.....	37.0	50.0	8.0	5.0
Maryland	.....	1.7	45.4	42.0	9.3	1.6
Virginia	0.3	3.9	45.7	39.3	10.5	.3
West Virginia	.....	1.0	26.2	45.5	25.6	1.7
North Carolina	.2	12.2	49.6	30.6	6.9	.5
South Carolina	5.1	56.6	35.9	2.4	.....	.....
Georgia	15.7	50.1	24.8	4.4	2.6	2.4
Florida	33.2	38.8	15.3	8.8	1.8	2.1
Ohio	.....	.7	21.3	55.1	20.6	2.3
Indiana	.....	2.5	20.4	59.0	15.2	2.9
Illinois	.....	.2	18.0	58.5	19.0	4.3
Michigan	.....	.....	3.9	56.9	34.3	4.9
Wisconsin	.....	.....	5.5	58.4	30.7	5.4
Minnesota	.....	.....	4.5	55.0	33.8	6.7
Iowa	.....	.5	10.7	59.1	25.4	4.3
Missouri	.....	3.6	26.7	47.6	16.6	5.5
North Dakota	.....	.....	5.0	51.6	36.7	6.7
South Dakota	.....	.....	7.8	44.1	35.1	13.0
Nebraska	.....	.....	13.7	51.2	27.7	7.4
Kansas	.....	.9	27.3	46.9	17.4	7.5
Kentucky	.....	.7	33.4	51.9	11.4	2.6

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TABLE II.—*Honeybees: Per cent of total swarming, by months*—Contd.

State.	Proportion of total annual increase of colonies in—					
	March.	April.	May.	June.	July.	August.
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Tennessee	.....	9.6	51.7	30.7	6.1	1.9
Alabama	4.7	37.0	32.5	19.0	1.8	5.0
Mississippi	1.8	45.4	30.4	15.0	6.5	.9
Louisiana	5.8	42.5	28.8	13.2	7.1	2.6
Texas	11.1	38.1	28.3	14.4	4.6	3.5
Oklahoma	.....	4.1	47.7	35.2	10.2	2.8
Arkansas	.8	23.5	40.4	25.0	3.8	6.5
Montana	.....	.....	9.6	38.4	42.3	9.7
Wyoming	.....	.....	2.5	22.0	53.0	22.5
Colorado	.....	.7	11.8	34.9	37.8	14.8
New Mexico	.....	3.7	34.0	31.1	15.4	15.8
Arizona	18.0	30.0	31.0	12.0	4.0	5.0
Utah	.....	.....	16.1	49.4	27.8	6.7
Nevada	.....	13.5	50.0	33.0	5.0	1.5
Idaho	.....	.....	9.8	50.0	35.7	4.5
Washington	.....	2.5	27.0	42.1	21.5	6.9
Oregon	.....	5.2	28.5	52.1	10.6	3.6
California	5.9	41.7	31.2	12.1	6.4	2.7
United States	3.5	16.4	25.1	36.2	14.8	4.0

INCREASE BY SWARMING.

The net changes in number of colonies from year to year is the balance between the increase by swarming, natural and artificial, and the losses. The annual primary increase by swarming must, to offset the losses, average between 15 and 20 per cent of the number of colonies, not counting the swarms that escape and establish themselves in hollow trees, rock cavities, etc. The number so escaping must be quite large, but can not be determined. Most of the increase is by natural swarming, but as this often reduces the production of surplus honey, there is an increasing tendency among beekeepers, amounting to a practice among a large part of those who make this a regular business, to prevent natural swarming during the main nectar flow, in order that the bees may devote all of their energies to the gathering of honey. Provision for increase in number of colonies, if desired, is made

later by the method of artificial swarming, which is, simply, division by the apiarist, after the removal of the honey surplus, of one strong colony into two or more, which are then allowed or assisted to build up in number and store supplies, so that by winter they may be strong colonies.

The results of an inquiry concerning the per cent of the total swarming, natural or artificial, occurring each month is shown in Table II.

In Florida, Arizona, California, and Texas, and occasionally in other States along the southern edge of the country, a few swarms will sometimes issue in February. It may be seen that swarming begins quite generally along the Gulf coast and in Arizona and Texas in March, becomes heavy in these States in April, continues there with lessened intensity during May, in which month it begins strongly throughout the central tiers of States and slightly in the northern tiers. In June it largely terminates in all the southern group, but reaches its maximum in the Central and Northern States. During July swarming continues heavy in the far Northern States and in the elevated portions of the Southerly and Western States, while in August swarming is limited, except in a few localities. Swarming occurs in September in certain sections where there is a heavy flow of nectar that month, such as the swamp sections of northern Indiana, although for the country as a whole and for all States swarming is practically over by the beginning of that month.

WINTERING BEES.

The provision made in the way of food supplies and extra protection for wintering, bears directly upon the rate of loss. Inquiry was made concerning winter food requirements of bees and the winter protection given, and the results are shown in Table III. Since the heaviest, and quite possibly the majority, of losses are due to starvation, inquiry has been made regularly in November concerning the supply of honey in the hive for winter, and the results are shown in this table. These last figures can not, unfortunately, be taken to reflect the average for all colonies. but more nearly that for colonies in the possession of progressive and professional beekeepers. These figures show that while con-

TABLE III.—*Honeybees: Winter confinement, food supply, and protection.*

State.	Usual length of time between fall and spring nectar flows.	Longest period confined to hives in usual winter without a flight.	Honey needed to winter a colony outdoors.	Honey on hand per colony at beginning of winter.				Extra winter protection furnished colonies.						
				1914–15	1915–16	1916–17	1917–18	Cellar.	Double-walled and packed hives.	Packed or in cellar (not separated).	Packed super.	Wrappings of tar paper, etc.	Straw covering and miscellaneous.	Total per cent given winter protection.
	Months.	*Months.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*Lbs.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine					31	35	30							
New Hampshire					31	35	37							
Vermont	7.6	3.6	29	25	30	32	26	67	14				14	95
Massachusetts	6.2	1.9	29	34	34	32	30	17	39	20				76
Rhode Island					29	35	31							
Connecticut	6.1	1.7	35	28	25	31	28	6		46				50
New York	7.2	2.8	31	29	34	34	32	25	33	22				80
New Jersey	5.7	2.0	25	27	29	33	35		30					30
Pennsylvania	7.0	2.2	31	30	34	34	34	1	35	4	15	3	2	60
Delaware					21	30	34							
Maryland	6.0	1.3	30	30	35	31	32	1	9		10	5		25
Virginia	5.7	1.3	28	32	27	32	30				3		1	4
West Virginia	7.0		35	35	34	35	30		10					10
North Carolina	4.6	1.2	26	25	27	27	28		5					5
South Carolina	5.2	1.0	30	31	30	40	31		2					2
Georgia	4.8	1.0	27	29	30	33	29						1	1
Florida	4.2	.5	40	40	31	28	32							0
Ohio	6.3	2.0	29	33	33	35	31	10	26		3	6		45
Indiana	6.4	2.0	31	34	34	35	31	3	30		4	3		40
Illinois	6.8	2.5	32	30	36	42	37	20	26		2		2	50

Michigan	7.0	3.2	29	29	35	35	30	30	13	34	.....	.....	3	80
Wisconsin	7.0	3.4	31	34	32	33	32	74	16	5	.....	2	.....	97
Minnesota	7.6	3.3	36	38	38	33	34	69	.....	30	.....	.....	.....	99
Iowa	6.5	2.2	32	28	41	39	37	40	10	21	.....	2	2	75
Missouri	6.4	1.6	33	26	37	39	39	.....	5	.....	12	.....	3	20
North Dakota	.....	.....	.....	.....	.....	35	36	.....	.....	.....	.....	.....	.....	.....
South Dakota	7.0	2.7	37	41	38	37	40	44	1	6	.....	.....	19	70
Nebraska	6.4	1.3	32	35	35	42	37	1	30	.....	12	.....	7	50
Kansas	5.7	1.6	33	36	35	35	35	.....	1	.....	3	1	5	10
Kentucky	5.9	1.4	34	42	33	35	34	.....	2	.....	6	.....	.....	8
Tennessee	5.5	1.1	32	36	27	29	27	.....	2	.....	.....	2	.....	4
Alabama	5.0	.6	35	36	30	34	41	.....	.....	.....	1	.....	.....	1
Mississippi	5.6	.5	29	32	30	27	34	.....	.....	.....	.....	.....	.....	0
Louisiana	.....	.5	30	32	30	38	35	.....	.....	.....	.....	.....	.....	0
Texas	4.1	.6	34	41	32	36	28	.....	.....	.....	1	.....	.....	1
Oklahoma	5.9	1.2	30	25	31	35	36	.....	.....	.....	.....	8	.....	8
Arkansas	4.0	.9	35	.....	26	25	31	.....	.....	.....	.....	.....	.....	0
Montana	.....	.....	.....	.....	27	37	42	.....	.....	.....	.....	.....	.....	.....
Wyoming	8.5	1.4	25	38	37	60	48	26	9	.....	.....	30	.....	65
Colorado	7.7	1.2	37	39	36	36	40	1	1	.....	5	4	1	12
New Mexico	6.3	.5	36	36	34	39	30	.....	2	.....	2	.....	.....	4
Arizona	3.6	.1	33	34	36	28	33	.....	.....	.....	.....	.....	[1]	0
Utah	8.8	1.4	49	44	34	42	41	1	30	.....	12	7	.....	50
Nevada	7.0	1.0	40	35	20	40	44	.....	.....	.....	.....	.....	[1]	0
Idaho	7.3	3.1	37	39	43	35	38	3	4	20	2	1	25	55
Washington	6.4	1.2	37	41	36	34	32	.....	3	.....	1	1	.....	5
Oregon	5.0	.7	26	31	35	32	31	.....	7	.....	.....	.....	.....	7
California	4.5	.5	33	44	39	34	34	.....	.....	.....	.....	.....	.....	.....
U. S. Average	5.8	1.5	31.9	33.5	32.5	34.5	32.9	9.1	9.0	4.3	2.5	.9	1.0	26.8

[1] No protection in the main honey producing sections of California.

finement is less as one proceeds southward, and limited to a few days at a time in the far Southern States, the winter consumption of stores increases rather than diminishes going southward, probably owing to greater winter activity of the bees. Little winter protection is provided for bees where not absolutely needed. Practically none is given in the Southern States, and but little in the middle tier, but in the far Northern States it is the general rule to pack or cellar the bees. Favorable methods of packing and the extent to which used in the different States are indicated in the table.

TABLE IV.—*Honeybees: Losses by disease and in wintering.*

State.	Summer losses of colonies from disease.			Winter losses of colonies from all causes.			
	1915	1916	1917	1914–15	1915–16	1916–17	1917–18
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Maine	5.0	1.2	1	.....	9.5	5.8	21
New Hampshire	0	2.0	1.3	.....	12.0	17.5	25
Vermont	2.0	2.0	.3	11.0	9.0	15.2	18
Massachusetts	1.0	4.0	2	13.7	23.0	12.1	41
Rhode Island	1.0	0.3	0	.....	19.0	2.3	20
Connecticut	0.2	10.0	4.7	16.0	22.0	5.9	31
New York	0.9	3.0	1.8	19.8	15.0	8.2	23
New Jersey	5.0	3.5	1.6	6.1	25.8	10.6	30
Pennsylvania	4.0	3.0	2.1	15.7	17.1	11.8	40
Delaware	0	1.5	5	.....	14.0	17.3	20
Maryland	0.8	0.5	2.1	11.4	19.0	6.3	41
Virginia	2.3	1.0	3.7	11.2	19.2	10.7	38
West Virginia	.....	3.0	1.1	5.7	14.7	8.8	31
North Carolina	0	0	2.2	5.1	17.0	15.5	17
South Carolina	0.4	0	2.5	13.1	11.2	13.5	11
Georgia	1.0	0	1.5	14.7	10.1	4.5	4
Florida	0	4.5	2.2	8.4	11.7	5.0	4
Ohio	2.0	3.5	2	16.1	16.6	10.7	34
Indiana	1.5	2.0	4.1	10.8	17.4	9.7	27
Illinois	2.0	1.3	5.6	11.3	10.7	6.7	21
Michigan	2.0	3.8	2.7	10.7	16.0	10.2	22
Wisconsin	1.5	6.0	2.5	5.4	14.4	10.0	13
Minnesota	0.1	1.5	2.2	16.5	10.0	12.6	14
Iowa	2.0	4.0	2.7	13.0	10.8	10.6	18
Missouri	2.4	1.0	1	31.0	12.6	7.9	17
North Dakota	.....	0	0	.....	8.0	5.3	5
South Dakota	5.0	2.0	2.5	7.8	15.7	13.5	14
Nebraska	5.0	2.0	2.7	15.8	16.1	12.5	21
Kansas	0.1	1.0	2.6	7.4	11.9	8.1	12
Kentucky	1.0	4.0	1.9	9.5	10.9	14.0	35

TABLE IV.—*Honeybees: Losses by disease and in wintering*—Continued.

State.	Summer losses of colonies from disease.			Winter losses of colonies from all causes.			
	1915	1916	1917	1914–15	1915–16	1916–17	1917–18
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Tennessee	0	1.0	1.6	8.9	20.9	5.9	24
Alabama	0	0	.3	17.3	11.7	7.6	6
Mississippi	1.0	0	5.3	23.2	7.9	7.1	7
Louisiana	0	0	.3	7.7	10.4	14.5	4
Texas	0.5	1.0	8	7.1	8.0	6.0	24
Oklahoma	0.3	0.5	5	15.4	11.4	7.5	13
Arkansas	0	0.5	1.6	25.0	15.7	13.2	9
Montana	3.0	0.3	1.2	.....	24.1	22.7	14
Wyoming	0.3	0.3	4	19.1	5.7	20.0	8
Colorado	2.0	2.0	4	10.5	11.2	14.3	8
New Mexico	1.4	1.0	2.6	9.2	4.8	9.0	8
Arizona	1.0	3.0	1.1	2.0	7.1	3.9	6
Utah	4.0	3.0	1.4	10.5	11.0	30.4	6
Nevada	.....	2.0	.5	5.0	1.9	14.7	7
Idaho	5.0	1.5	1.2	5.9	10.5	46.6	5
Washington	2.0	3.0	3.2	19.8	17.8	9.0	6
Oregon	0	3.0	7.4	3.9	20.4	20.0	8
California	4.5	5.0	6.4	5.0	8.5	10.0	11
United States.	1.5	2.3	3.5	12.6	13.3	10.1	18.7

LOSSES.

The losses of bees by disease, principally foulbrood, during the summer, range from practically nothing to almost 10 per cent in some States, though the latter figures are exceptional and may be due to mistaking starvation for disease. The losses to bees in wintering are severe, ranging for the United States as a whole from 10 to almost 15 per cent, and rising in some States to almost 50 per cent in the winter of 1916–17. Details for three years are shown in Table IV. The losses for the winter of 1917–18, owing to an early and exceedingly severe winter, are reported at 18.7 per cent, more than a half greater than the average of the three preceeding winters, and the heaviest in a long period of years.

TABLE V.—*Honeybees: Winter losses, causes and percentages of.*

State.	Causes and percentages of winter losses.											
	Queen lost or failing.			Starvation.			Cold, exposure, smothering.			Moths and ants.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	.....	0.3	0.6	.....	5.0	1.6	.....	3.2	1.3	.....	.....	0.3
New Hampshire	.....	.....	.....	.....	9.4	4.6	.....	2.0	.9	.....	.....	.....
Vermont	0.1	.5	.9	0.4	4.7	4.8	0.1	2.6	5.0	.....	.....	.....
Massachusetts	.....	.2	.5	.....	15.4	4.0	2.1	5.0	2.3	.....	.....	.....
Rhode Island	.....	.....	.....	.....	5.7	.....	.....	3.0	2.3	.....	.....	.....
Connecticut	.....	1.8	.4	16.0	7.0	1.3	.....	10.0	1.2	.....	.....	.4
New York	1.2	2.0	2.1	.6	10.1	2.1	.1	2.0	.5	.....	.....	.....
New Jersey	2.2	5.0	2.1	.....	11.9	2.8	.....	3.5	4.3	.....	.....	.....
Pennsylvania	2.2	.5	1.6	1.2	7.5	3.3	1.7	3.0	1.3	.....	0.3	.....
Delaware	.....	5.0	2.4	.....	6.0	7.7	.....	.....	1.3	.....	2.0	2.3
Maryland	.3	3.0	.9	4.7	11.2	1.8	.....	.6	.7	.2	1.5	.6
Virginia	1.5	.8	1.0	1.8	13.3	3.0	.1	1.8	.1	.6	1.5	.4
West Virginia	.....	1.5	.8	.....	8.3	2.7	.....	1.4	3.3	.....	.5	.5
North Carolina	.4	.4	.9	2.6	11.4	6.7	.....	2.0	2.7	1.7	2.0	1.1
South Carolina	5.7	1.5	.7	3.3	5.5	9.9	.....	1.5	.....	3.7	.5	2.3
Georgia	2.8	1.5	3.0	10.7	3.1	.....	.....	.5	.4	1.1	4.0	.8
Florida	2.3	2.0	1.2	.....	2.0	2.1	.....	.2	.....	.....	4.0	.3
Ohio	.8	2.2	2.1	.....	6.7	.9	2.6	2.0	4.8	.....	.2	.....
Indiana	.9	2.0	2.4	1.4	10.2	.9	2.2	1.0	3.8	.....	.2	.....
Illinois	2.1	1.2	1.8	.5	4.5	1.3	2.5	1.6	1.0	.....	1.4	.....
Michigan	2.9	2.0	1.4	2.6	10.0	2.8	1.6	1.5	1.1	.....	.2	.....
Wisconsin	4.1	3.0	1.8	.....	6.6	3.4	.1	1.2	1.8	.....	.....	.1
Minnesota	.2	2.2	1.5	10.5	2.6	4.5	.....	2.6	.8	.....	.3	.2
Iowa	2.4	2.5	2.1	.1	4.5	1.7	.....	1.5	4.2	.....	.3	.3
Missouri	.....	3.0	1.5	.....	2.2	1.6	4.3	1.7	2.3	.....	2.0	.8
North Dakota	.....	.....	.....	.....	4.0	1.8	.....	.....	1.8	.....	.....	.....
South Dakota	.4	.7	.8	2.8	5.0	5.4	3.0	3.0	.8	.....	.....	.....
Nebraska	2.4	3.0	2.4	3.6	3.8	1.5	2.6	3.5	5.9	.....	.2	.....
Kansas	.4	1.0	3.9	3.5	6.3	3.0	.1	1.1	.3	.....	.8	.....
Kentucky	.9	2.4	.8	2.7	6.0	1.0	.7	1.0	8.1	.1	.1	.....
Tennessee	1.4	.6	.8	3.7	12.6	3.8	.3	1.5	.5	.3	1.2	.3
Alabama	.8	1.0	.9	10.5	5.0	5.3	.....	.2	.....	.1	3.0	.5
Mississippi	.7	.4	.7	11.4	2.4	4.3	.....	.....	.4	1.3	3.0	.....
Louisiana	2.1	.2	1.5	5.6	1.8	3.8	.....	.....	.....	.....	5.6	2.0
Texas	1.5	1.5	2.8	3.1	3.2	2.4	.....	.1	.1	.2	1.5	.2

TABLE V.—*Honeybees: Winter losses, causes and percentages of*—Continued.

State.	Causes and percentages of winter losses.											
	Queen lost or failing.			Starvation.			Cold, exposure, smothering.			Moths and ants.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Oklahoma	1.0	0.2	1.0	1.0	5.6	3.6	2.4	2.0	0.7	.....	3.0	0.7
Arkansas	.....	3.5	1.1	25.0	8.0	8.8	.....	.1	1.9	.....	3.0	.9
Montana	.....	.5	1.9	.....	.5	1.3	.....	22.1	15.8	.....	.....	.....
Wyoming	1.7	2.0	.5	17.4	1.0	.4	.....	1.0	13.0	.....	.....	.....
Colorado	2.3	2.0	2.0	.5	2.0	.7	1.4	2.5	8.7	.....	.....	.....
New Mexico	1.7	2.2	1.6	.....	.2	2.2	.....	.6	1.9	.....	1.1	.1
Arizona	1.5	.5	.9	.....	5.0	2.3	.....	.....	.....	.....	.....	.....
Utah	4.8	2.5	.7	.....	1.3	.8	1.0	4.9	19.9	.....	.....	.....
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	14.7	.....	.....	.....
Idaho	2.6	2.1	.9	.2	4.0	.4	.2	1.0	24.6	.....	.....	.....
Washington	.9	1.5	.8	.2	4.0	3.5	16.9	8.4	1.3	.....	.3	.1
Oregon	2.2	1.2	.6	.....	2.0	1.2	.....	13.0	11.7	.2	1.0	.....
California	2.5	3.0	2.5	.1	1.0	2.4	.....	.8	1.2	.....	.2	.....
U. S. average	1.5	1.8	1.7	3.2	6.0	2.7	.9	1.7	2.4	.3	1.1	.3

State.	Causes and percentages of winter losses.								
	Foul brood and other diseases.			Poor honey, dysentery.			Late and weak swarms.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	.....	.....	.....	.....	0.5	.....	.....	0.2	.....
New Hampshire	.....	.....	.....	.....	.4	12.0	.....	.2	.....
Vermont	.....	.....	0.3	2.7	.....	2.1	0.1	.8	.....
Massachusetts	.....	0.8	.3	.5	.....	.2	11.1	.3	1.3
Rhode Island	.....	.....	.....	.....	.....	.....	.....	.....	.....
Connecticut	.....	3.0	.1	.....	.....	.....	.....	.....	1.7
New York	.....	.....	.1	9.4	.3	.2	6.4	.....	1.1
New Jersey	0.1	2.0	.6	.5	.....	.1	1.5	.....	.....
Pennsylvania	.....	3.0	3.2	1.8	.4	1.3	2.7	.6	.....
Delaware	.....	.....	.....	.....	.....	.....	.....	.....	1.3
Maryland	.....	.....	.9	3.7	.2	.1	1.4	.....	1.0
Virginia	.....	.1	1.7	1.3	1.0	1.6	1.4	.3	1.9
West Virginia	.....	.....	.....	5.7	1.5	.2	.....	1.0	.7
North Carolina	.....	.5	.....	.....	.....	1.1	.4	.5	.8
South Carolina	.....	2.0	.....	.....	.....	.7	.4	.2	.....

TABLE V.—*Honeybees: Winter losses, causes and percentages of*—Continued.

State.	Causes and percentages of winter losses.								
	Foul brood and other diseases.			Poor honey, dysentery.			Late and weak swarms.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Georgia	.....	.....	0.1	.....	.....	.....	.....	0.3	.....
Florida	.....	3.0	.....	.....	.....	0.5	2.3	.....	.....
Ohio	1.5	1.2	.3	5.4	1.0	.4	.2	1.0	0.2
Indiana	.6	.3	.1	2.9	.3	.3	.....	.2	.2
Illinois	.....	.4	.2	4.3	.....	.2	1.8	.1	.9
Michigan	.7	.3	1.2	2.1	1.8	.8	.2	.2	.3
Wisconsin	.....	.1	.3	.6	2.0	.5	.....	.3	.6
Minnesota	.....	.....	.....	5.3	.5	2.2	.....	.1	1.5
Iowa	1.3	.2	.1	3.4	.5	.4	2.7	.....	.7
Missouri	.....	.7	.5	3.3	.....	.....	.....	2.0	.2
North Dakota	.....	.....	.....	.....	.....	.....	.....	4.0	.....
South Dakota	.....	3.5	.2	.....	.....	4.0	.....	.5	.9
Nebraska	.....	1.0	.5	3.6	.....	.....	.....	2.0	.....
Kansas	.....	.....	.....	.....	.2	.....	3.3	1.0	.1
Kentucky	.2	.5	1.1	3.2	.....	.9	.....	.2	.5
Tennessee	.....	.3	.....	1.0	2.5	.....	1.7	.....	.4
Alabama	.1	2.0	.7	.....	.1	.....	.....	.1	.1
Mississippi	2.2	.7	1.5	.5	.....	.....	.....	.....	.2
Louisiana	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	.2	.1	.....	.....	.....	.....	1.5	.....	.4
Oklahoma	.....	.....	.....	3.	.....	.1	2.0	.3	.....
Arkansas	.....	.1	.....	.....	.....	.....	.....	.....	.....
Montana	.....	.8	1.5	.....	.....	1.3	.....	.2	.8
Wyoming	.....	.....	.2	.....	.....	.6	.....	1.0	.4
Colorado	.6	3.5	.4	.8	.1	1.7	1.5	.5	.4
New Mexico	.....	.....	.....	.....	.....	.....	.....	.....	1.4
Arizona	.2	.....	.....	.....	.....	.....	.3	.....	.1
Utah	.1	1.5	.2	3.3	.....	1.5	.....	2.0	6.8
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	.....	.5	.....	.6	2.0	[1]19.8	.6	.2	.6
Washington	.....	.2	.5	.....	1.5	.....	.8	.....	.7
Oregon	1.0	.6	1.6	.....	2.0	5.5	.....	.5	.....
California	1.2	2.0	3.4	.....	.....	.....	.3	.5	.....
U. S. average	.3	.7	.8	2.1	.5	.6	1.1	.4	.5

[1] Honey dew, coupled with extremely severe winter.

TABLE V.—*Honeybees: Winter losses, causes and percentages of*—Continued.

State.	Causes and percentages of winter losses.								
	Lack of young bees.			Miscellaneous and unknown.			Total loss of colonies.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	.....	0.3	.....	.....	0.2	2.1	.....	9.5	5.8
New Hampshire	.....	.....	.....	.....	.....	.....	.....	12.0	17.5
Vermont	.....	.....	.....	7.6	1.0	2.1	11.0	9.0	15.2
Massachusetts	.....	.8	0.7	.....	.....	2.8	13.7	23.0	12.1
Rhode Island	.....	.....	.....	.....	1.0	.....	.....	19.0	2.3
Connecticut	.....	.....	.....	.....	.2	.7	16.0	22.0	5.9
New York	.....	.1	.1	2.1	.5	1.9	19.8	15.0	8.2
New Jersey	1.3	1.4	.....	.5	2.0	.7	6.1	25.0	10.6
Pennsylvania	.2	.1	.4	5.9	1.7	.7	15.7	17.0	11.8
Delaware	.....	.....	.....	.....	1.0	2.3	.....	14.0	17.3
Maryland	1.1	.....	.....	.....	2.5	.3	11.4	19.0	6.3
Virginia	.4	.3	.....	4.1	1.0	.9	11.2	19.2	10.7
West Virginia	.....	.....	.....	.....	.5	.7	5.7	14.7	8.8
North Carolina	.....	.....	.....	.....	.2	2.2	5.1	17.0	15.5
South Carolina	.....	.....	.....	.....	.....	.....	13.1	11.2	13.5
Georgia	.....	.....	.....	.1	.7	.2	14.7	10.1	4.7
Florida	.....	.....	.....	3.8	.5	1.0	8.4	11.7	5.0
Ohio	5.5	.3	.6	.1	2.0	1.3	16.1	16.6	10.7
Indiana	1.7	.7	.4	1.1	2.5	1.5	10.8	17.4	9.7
Illinois	.....	.....	.....	.1	1.5	1.2	11.3	10.7	6.7
Michigan	.....	.....	.3	.6	.....	2.4	10.7	16.0	10.2
Wisconsin	.....	.5	.....	.6	.7	1.5	5.4	14.4	10.0
Minnesota	.....	.6	.2	.5	1.2	1.7	16.5	10.0	12.6
Iowa	2.0	.5	.4	1.1	.8	.8	13.0	10.8	10.6
Missouri	.....	.....	.5	23.4	1.0	.4	31.0	12.6	7.9
North Dakota	.....	.....	.....	.....	.....	1.8	.....	8.0	5.3
South Dakota	.8	.....	.....	.8	3.0	1.5	7.8	15.7	13.5
Nebraska	.....	.1	.6	3.6	2.5	1.6	15.8	16.1	12.5
Kansas	.....	.....	.1	.1	1.5	.7	7.4	11.9	8.1
Kentucky	.....	.....	.1	1.7	.7	1.6	9.5	10.9	14.0
Tennessee	.....	.2	.....	.5	2.0	.2	8.9	20.9	5.9
Alabama	.....	.....	.....	5.8	.4	.....	17.3	11.7	7.6
Mississippi	.....	.....	.....	7.1	1.4	.....	23.2	7.9	7.1
Louisiana	.....	.....	.....	.....	1.0	8.0	7.7	10.4	14.5
Texas	.....	1.5	.....	.6	.1	.1	7.1	8.0	6.0
Oklahoma	.....	.....	.....	8.7	.3	1.4	15.4	11.4	7.5
Arkansas	.....	.....	.....	.....	1.0	.5	25.0	15.7	13.2
Montana	.....	.....	.....	.....	.....	.....	.....	24.1	22.7
Wyoming	.....	.....	.....	.....	.7	4.9	19.1	5.7	20.0
Colorado	1.1	.1	.3	2.3	.5	.....	10.5	11.2	14.3

TABLE V.—*Honeybees: Winter losses, causes and percentages of*—Continued.

State.	Causes and percentages of winter losses.								
	Lack of young bees.			Miscellaneous and unknown.			Total loss of colonies.		
	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17	1914–15	1915–16	1916–17
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
New Mexico	2.5	.....	1.5	5.0	0.7	0.2	9.2	4.8	9.0
Arizona	.....	.....	.....	.....	1.6	.6	2.0	7.1	3.9
Utah	1.0	.....	.....	.3	.3	.5	10.5	11.0	30.4
Nevada	.....	.....	.....	5.0	1.9	.....	5.0	1.9	14.7
Idaho	1.1	0.2	.....	.6	.5	.3	5.9	10.5	46.6
Washington	.....	.4	1.6	1.0	1.5	.5	19.8	17.8	9.0
Oregon	.....	.....	.....	.5	.1	.....	3.9	20.4	20.0
California	.....	.....	.....	.9	1.0	.4	5.0	8.5	10.0
U. S. average	.4	.2	.2	2.8	.9	.9	12.6	13.3	10.1

CAUSES OF WINTER LOSS.

The principal causes of winter loss, as reported, are shown by States in Table V, being in order starvation, cold, queenlessness, weakened condition resulting from disease or poor honey, such as late unripened aster for the winter food supply, a small cluster of bees due to late swarming or other causes, and lack of young bees from any cause but due usually to a failing queen or an unfavorable autumn for brood rearing.

Starvation, the most frequently reported cause of loss, is entirely preventable, and losses from cold may also be greatly lessened. The other factors are more difficult to control, but losses can be greatly minimized by intelligent care and attention. The losses shown in Tables IV and V unquestionably considerably understate the average loss, because they represent in the main the experience of the better beekeepers. Those who keep bees housed in kegs, thin store boxes, sections of hollow logs (gums), and similar receptacles, giving them no attention beyond "robbing" them annually of their honey, often at the most inopportune time for the bees, leaving no reserve of food to carry the colony through periods of summer drought and winter cold, and lacking knowledge of the nature and cure of the diseases and other ills that occasionally afflict bees, are naturally the ones

to suffer the most severe losses, and such keepers are not as a rule among those whose reports are included in these tables.

While the losses under such conditions are very severe, poor beekeeping is tending to its own correction, as brood diseases, once they attain a foothold in a community, soon eliminate the inefficient and careless beekeepers by eliminating their bees, while the informed and attentive apiarist is able to control these diseases, though sometimes only through the expenditure of much time, effort, and expense.

Losses are frequently reported as being caused by the bee moth (wax moth), but it is well known to experienced beekeepers that these insects are unable to cause serious injury to strong colonies. In weak or dying colonies, where the bees are unable to care for and protect the comb, the moths deposit eggs in the hive and its contents are rapidly destroyed by their larva. Ants, to the contrary, can and frequently do destroy colonies, particularly in the South. Skunks and mice occasionally ruin colonies.

TABLE VI.—*Honey production: Annual yields per colony.*

State.	1899 [1]	1909 [1]	1913	1914	1915	1916	1917	Average 5 years, 1913–17.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Maine	18	15	38	30	36	52	35	38
New Hampshire	16	14	27	30	48	38	38	36
Vermont	14	16	33	20	35	38	42	34
Massachusetts	13	13	31	22	30	36	26	29
Rhode Island	17	11	45	40	35	36	55	42
Connecticut	11	15	35	28	26	33	37	32
New York	18	20	37	22	59	65	40	45
New Jersey	12	15	40	12	31	66	25	35
Pennsylvania	16	15	45	28	34	54	33	39
Delaware	10	10	21	20	30	36	22	26
Maryland	11	13	40	25	22	46	30	33
Virginia	12	13	38	35	47	32	33	37
West Virginia	15	14	20	25	33	25	33	27
North Carolina	10	10	25	28	42	23	30	30
South Carolina	9	9	25	18	23	35	35	27
Georgia	9	7	30	30	32	33	44	34
Florida	17	19	50	42	65	85	86	66
Ohio	13	10	50	23	22	60	30	37
Indiana	14	8	60	25	26	62	49	44
Illinois	16	9	60	17	44	81	33	47

[1] 1899 and 1909 deduced from United States Census Reports, 1913–1917, based on reports to Bureau of Crop Estimates from honey producers.

TABLE VI.—*Honey production: Annual yields per colony*—Continued.

State.	1899	1909	1913	1914	1915	1916	1917	Average 5 years, 1913–17.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Michigan	21	22	50	37	50	65	43	49
Wisconsin	25	23	60	40	63	69	56	58
Minnesota	22	17	60	35	51	57	56	52
Iowa	17	15	65	25	66	82	46	57
Missouri	15	10	30	8	35	75	26	35
North Dakota	27	22	.....	.....	72	40	95	69
South Dakota	24	21	50	25	48	84	53	52
Nebraska	17	12	50	30	51	96	49	55
Kansas	13	8	25	20	35	60	46	37
Kentucky	13	10	40	25	40	53	57	43
Tennessee	11	10	30	28	25	31	29	29
Alabama	9	7	35	28	39	48	35	37
Mississippi	11	8	35	33	29	31	43	34
Louisiana	12	11	35	35	30	42	52	39
Texas	12	13	35	55	37	45	12	37
Oklahoma	9	7	35	25	29	39	36	33
Arkansas	13	10	30	20	25	29	33	27
Montana	11	26	35	62	63	65	95	64
Wyoming	19	30	75	70	50	60	89	69
Colorado	29	32	60	43	36	68	46	51
New Mexico	23	44	50	55	40	59	38	48
Arizona	49	43	70	60	70	55	65	64
Utah	38	43	70	65	57	33	106	66
Nevada	31	42	75	40	90	60	44	62
Idaho	20	46	55	56	70	50	72	61
Washington	17	15	45	40	57	45	61	50
Oregon	18	18	40	35	35	30	58	40
California	28	51	36	75	72	62	57	60
United States	14.9	15.9	40.6	32.2	42.3	52.8	40.3	41.6

YIELDS OF HONEY PER COLONY.

Dividing the total production of honey for the years 1899 and 1909 by the numbers of colonies of bees at the beginning of the seasons of 1900 and 1910, respectively, using in both cases figures reported by the United States Census, we secure approximate yields for the two years of about 15 and 16 pounds, respectively. But the yields thus deduced are much below the facts. The census enumerators have difficulty in securing figures for production in a previous year because many people have failed to keep records, or because

bees have changed hands and the new holders know nothing of their performance the past season. Only about half those reporting colonies of bees reported any honey production. The figures for the different States are shown in Table VI. The returns of the reporters of the Bureau of Crop Estimates indicate yields much higher, being for the five years, 1913 to 1917, inclusive, 40.6, 32.2, 42.3, 52.8, and 40.3 pounds, respectively. The figures by States are shown in comparison with the census averages in Table VI. These figures, however, represent to a considerable extent the production of the colonies belonging to the reporters, which would naturally be above the average, because the reporters are in the main producers of honey on a commercial scale, using modern methods and giving proper attention to the bees, with the natural result of increased yields. They represent also, in large proportion, beekeepers who are not farmers. The latter, usually handling bees as a side line, are able to give them attention only when their main occupations are not pressing. Unfortunately, general farm work is usually pressing at the time when bees must have attention if good honey crops are to be secured. It will be seen by reference to Table VI that the highest yields, year by year, are secured in the Western States, including those of the Pacific coast, and especially California, the North Central group, particularly those of the northern tier, the Middle Atlantic group, Florida and Texas. The Southeastern States possess potential resources for heavy honey production, but modern equipment and practices have yet to be generally introduced there.

TABLE VII.—*Honey production.*

(Unites States Census.)

State.	Honey produced in year stated.					
	1859	1869	1879	1889	1899	1909
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Maine	314,685	155,640	198,499	260,481	200,080	112,051
New Hampshire	125,142	56,944	87,886	112,114	89,260	65,038
Vermont	212,150	142,932	221,729	379,096	182,278	160,283
Massachusetts	59,125	25,299	49,397	90,929	109,050	96,802
Rhode Island	5,261	6,290	8,397	13,740	28,450	14,221
Connecticut	62,730	32,158	100,378	130,632	122,960	145,722
New York	2,369,751	896,286	2,088,845	4,281,964	3,422,497	3,191,733
New Jersey	185,925	60,636	131,342	160,310	174,250	152,072
Pennsylvania	1,402,128	796,989	1,415,093	2,453,424	2,526,202	1,840,360
Delaware	66,137	33,151	76,234	66,468	101,410	62,777

TABLE VII.—*Honey production*—Continued.

State.	Honey produced in year stated.					
	1859	1869	1879	1889	1899	1909
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*	*Pounds.*
Maryland	193,354	118,938	283,752	301,157	306,788	306,367
District of Columbia	510	.....	1,723	341	530	3,657
Virginia	1,431,591	505,239	1,090,451	1,531,147	1,708,320	1,344,360
West Virginia	.....	376,997	833,564	1,218,686	1,673,120	1,550,739
North Carolina	2,055,969	1,404,040	1,591,590	2,373,560	2,477,800	1,809,127
South Carolina	526,077	194,253	354,350	856,688	872,590	653,119
Georgia	953,915	610,877	1,056,034	1,757,758	1,650,745	884,662
Florida	115,520	50,884	211,943	562,986	677,540	747,832
Ohio	1,459,601	763,124	1,626,847	2,894,059	1,980,530	1,001,179
Indiana	1,224,489	395,278	967,581	2,106,817	1,681,554	687,097
Illinois	1,346,803	1,547,178	1,310,806	4,602,941	2,961,080	1,428,640
Michigan	769,282	280,325	1,028,595	2,487,134	2,099,460	2,507,810
Wisconsin	207,294	299,341	813,806	3,515,761	2,677,100	2,153,819
Minnesota	34,285	92,606	234,054	1,160,390	986,446	976,262
Iowa	917,877	853,213	1,310,138	6,813,412	2,539,784	2,374,080
Missouri	1,585,983	1,156,444	721,080	4,492,178	3,018,929	2,105,815
North Dakota	.....	[1]110	[1]6,180	990	7,530	11,084
South Dakota	.....			55,833	49,320	139,714
Nebraskaa	5,843	28,114	86,645	746,212	866,200	527,868
Kansas	16,944	110,827	201,034	890,913	1,187,569	609,785
Kentucky	1,768,692	1,171,500	1,500,565	2,310,615	2,681,720	1,558,670
Tennessee	1,519,390	1,039,550	2,130,689	2,284,155	2,404,550	1,468,123
Alabama	47,233	320,674	841,535	1,824,286	1,930,410	891,954
Mississippi	708,237	199,581	382,560	822,673	1,048,490	559,012
Louisiana	255,481	37,646	168,441	271,962	426,490	340,134
Texas	594,273	275,169	761,225	3,286,386	4,780,204	3,093,097
Oklahoma	.....	.....	.....	2,800	[2]172,640	140,234
Arkansas	806,327	276,824	1,012,721	1,111,246	1,405,320	913,515
Montana	.....	.....	.....	20	19,940	163,510
Wyoming	.....	.....	.....	350	19,220	138,924
Colorado	.....	.....	8,340	390,906	1,732,630	2,306,492
New Mexico	.....	.....	450	21,470	139,998	439,528
Arizona	.....	.....	650	126,124	930,420	1,025,282
Utah	.....	575	87,331	479,158	1,292,118	1,138,091
Nevada	.....	363	24,296	88,557	178,650	354,905
Idaho	.....	.....	50	37,146	379,450	1,011,068
Washington	5,256	25,636	20,005	156,435	530 790	503,580
Oregon	821	66,858	122,348	435,028	979,140	839,981
California	12,276	294,326	574,029	3,929,889	3,667,738	10,264,715
United States	23,366,357	14,702,815	25,743,208	63,897,327	61,099,290	54,814,890

[1] Dakota, before division.

[2] Includes Indian Territory.

TOTAL PRODUCTION OF HONEY, BY DECADES, SINCE 1859.

According to the census figures the production of honey in the year 1859, the first in which this inquiry was made, was in round figures 23,000,000 pounds, a very respectable figure compared with the later reports, but unfair in comparison with the figures of recent decades, because of the great increase in the relative number of commercial producers whose crops do not figure in the census returns. In the year 1869 the production was reduced to about 15,000,000 pounds, due no doubt in large part to the general disorganization and loss incident to the Civil War. The year 1879 saw a recovery to 26,000,000 and the record for 1889 was the highest of any year reported by the census, almost 64,000,000 pounds. For 1889, 61,000,000 pounds were reported and for 1909 only 55,000,000. The latter was a year of poor honey production in the Central and Southern States.

The most striking feature of the figures, given by States in Table VII, is the increase in honey production in the Western States and particularly in California, an increase entirely out of proportion to the development of the West in general lines of agriculture, and so great that the Rocky Mountain and Pacific Coast States are shown by the last census, which, however, covered a favorable honey year in the West and a poor one in the Central and Southern States, to have produced substantially one-third of the total honey crop of the United States, California alone producing almost one-fifth.

In the greatest of the honey years recorded by the census, 1889, the figures for some States are quite astonishing from the standards of other years, New York producing over 4,000,000, Illinois and Missouri between 4,000,000 and 5,000,000, and Iowa almost 7,000,000 pounds, this being for New York a third more, for Illinois and Missouri in excess of a half more, and for Iowa more than double, the crop of any other year reported.

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TABLE VIII.—*Honey: Form in which produced.*

State.	Form produced.											
	Comb in sections.				Extracted.				Bulk comb, or "chunk."			
	1914	1915	1916	1917	1914	1915	1916	1917	1914	1915	1916	1917
	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
Maine	80	80	75	81	15	17	15	11	5	3	10	8
New Hampshire	.....	85	90	90	.....	15	5	10	.....	0	5	0
Vermont	66	90	80	82	28	8	14	15	6	2	6	3
Massachusetts	67	87	71	61	32	13	24	34	1	0	5	5
Rhode Island	5	20	.....	10	95	80	.....	85	0	0	.....	5
Connecticut	48	61	55	65	47	29	40	33	5	10	5	2
New York	47	61	58	54	50	39	40	45	3	0	2	1
New Jersey	25	.....	42	41	75	.....	57	59	0	0	1	0
Pennsylvania	65	60	64	44	29	30	29	50	6	10	7	6
Delaware	.....	60	.....	63	.....	30	.....	18	.....	10	.....	19
Maryland	69	85	70	70	22	10	20	25	9	5	10	5
Virginia	87	75	57	72	12	13	23	8	1	12	20	20
West Virginia	.....	.....	53	72	.....	.....	4	5	.....	.....	43	23
North Carolina	.....	34	32	39	.....	17	20	21	.....	49	48	40
South Carolina	.....	40	.....	30	.....	30	.....	40	.....	30	.....	30
Georgia	28	.....	14	23	33	.....	45	46	39	.....	41	31
Florida	11	.....	9	10	88	.....	89	89	1	.....	2	1
Ohio	66	65	59	64	32	32	36	35	2	3	5	1
Indiana	52	64	53	57	36	21	34	37	12	15	13	6
Illinois	42	34	57	51	56	65	39	46	2	1	4	3
Michigan	56	54	56	38	43	46	44	60	1	0	0	2
Wisconsin	41	43	39	35	58	57	59	63	1	0	2	2
Minnesota	36	50	47	38	63	45	52	61	1	5	1	1
Iowa	56	58	52	49	42	40	45	48	2	2	3	3
Missouri	32	34	40	47	38	37	30	36	30	29	30	17
North Dakota	.....	.....	50	.....	.....	.....	50	.....	.....	.....	0	....
South Dakota	77	62	57	40	22	30	36	55	1	8	7	5
Nebraska	43	36	68	64	42	63	30	35	15	1	2	1
Kansas	67	65	60	61	28	25	23	30	5	10	17	9
Kentucky	49	.....	38	41	33	.....	36	44	18	.....	26	15
Tennessee	31	22	28	36	23	28	27	27	46	50	45	37
Alabama	34	32	25	18	41	42	52	62	25	26	23	20
Mississippi	49	.....	41	46	26	.....	19	32	25	.....	40	22
Louisiana	.....	.....	11	15	.....	.....	40	35	.....	.....	49	50
Texas	4	1	7	9	51	52	55	69	45	47	38	22
Oklahoma	36	37	42	28	17	15	18	23	47	48	40	49
Arkansas	25	.....	41	35	15	.....	8	18	60	.....	51	47
Montana	.....	70	63	67	.....	27	35	29	.....	3	2	4
Wyoming	92	97	77	46	8	3	16	54	0	0	7	0
Colorado	67	70	63	62	30	30	31	37	3	0	6	1

TABLE VIII.—*Honey: Form in which produced*—Continued.

State.	Form produced.											
	Comb in sections.				Extracted.				Bulk comb, or "chunk."			
	1914	1915	1916	1917	1914	1915	1916	1917	1914	1915	1916	1917
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
New Mexico	31	.....	42	35	61	.....	40	47	8	.....	18	18
Arizona	6	10	0	5	94	90	100	95	0	0	0	0
Utah	17	15	.....	10	83	85	.....	90	0	0	.....	0
Nevada	.....	.....	30	20	.....	.....	70	80	.....	.....	0	0
Idaho	47	60	39	40	51	37	58	60	2	3	3	0
Washington	46	32	37	25	54	68	59	72	0	0	4	3
Oregon	64	48	.....	60	34	52	.....	31	2	0	.....	9
California	18	17	17	15	79	82	81	82	3	1	2	3
United States	41.7	40.0	38.1	37.9	42.1	41.0	43.8	48.4	16.2	19.0	18.1	13.7

FORM OF HONEY PRODUCED.

Honey is produced in three principal forms: First, comb-honey in 1-pound sections, as commonly retailed; second, extracted or liquid honey, ordinarily removed from the comb by means of a centrifugal machine, although sometimes by crushing the comb and draining, or by pressing it, although this last procedure is likely to produce an inferior product; third, "bulk" or "chunk" honey, the comb honey more or less broken and mixed with the liquid honey. A pleasing form of "chunk" honey is that prepared in large quantities in Texas and some other States, choice comb being cut from the frames, packed in tin pails or glass jars and the remaining space in the container filled with extracted honey from the same source.

According to the reports to the bureau, which are shown in detail by States and for the four years, 1914 to 1917, inclusive, in Table VIII, the proportion of comb and "chunk" honey shows a tendency to decrease, and of extracted to increase, the change from "chunk" and to extracted being particularly noticeable in 1917, reflecting an endeavor on the part of the producers to increase the production of honey in view of the threatened sugar shortage. Bees are ordinarily

able to produce a larger quantity of honey if they are not compelled to build comb for it, and by emptying the combs and replacing them in the hive, the bee is able in periods of heavy nectar secretion to proceed immediately to the storage of more honey.

By reference to Table VIII it will be seen that the greater proportion of section comb honey is produced in the North Atlantic, the North Central and a few Western States, practically all of the "bulk" or "chunk" honey in the Southeastern and South Central States, and the larger proportion of the extracted or liquid form in the North Central and Western States. The comb honey is most in demand for the home and fancy trade and for seasonal consumption, much the greater proportion being consumed within the first six months after its production, the extracted as a staple product, being stored and handled throughout the year and entering into interstate and foreign commerce, and the "bulk" or "chunk" honey for home consumption, finding only a limited and local market. The present year shows a decided drift in the Southern States away from the production of "chunk" honey and toward comb in sections, being a transition stage accompanying the gradual introduction of improved methods in the States where "bulk" honey has hitherto been a, if not the, principal form.

It should be borne in mind that in the Southeastern States the less progressive elements of the industry, which are more largely devoted to the production of "chunk" honey, are but lightly represented in these returns and that the production of that form is probably in much larger relative proportion than here shown, while comb-honey is overstated, both in these States and in some of heavy commercial production, such as California, where the extracted forms a larger proportion than indicated.

TABLE IX.—*Honey: Color.*

State.	Form and color.															
	White.				Light amber.				Amber.				Dark.			
	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.
	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.	P.c.
Maine	49	7	4	60	13	2	2	17	10	1	1	12	9	1	1	11
New Hampshire	56	....	....	56	24	....	....	24	16	....	....	16	4	....	....	4
Vermont	59	6	3	68	15	5	....	20	3	3	....	6	5	1	....	6
Massachusetts	14	2	1	17	12	12	1	25	19	16	2	37	16	4	1	21
Rhode Island	7	....	....	7	....	15	....	15	3	37	....	40	....	33	5	38
Connecticut	12	1	....	13	18	6	....	24	19	18	2	39	16	8	....	24
New York	32	23	1	56	7	5	....	12	3	6	....	9	12	11	....	23
New Jersey	16	10	....	26	8	22	....	30	9	21	....	30	8	6	....	14
Pennsylvania	18	16	2	36	3	3	1	7	6	10	1	17	17	21	2	40
Delaware	20	10	7	37	20	1	....	21	10	2	....	12	13	5	12	30
Maryland	16	8	....	24	14	13	4	31	14	12	1	27	13	5	....	18
Virginia	32	1	7	40	19	4	4	27	10	3	5	18	11	....	4	15
West Virginia	36	3	8	47	14	....	2	16	13	2	7	22	9	....	6	15
North Carolina	11	....	17	28	11	6	10	27	8	4	7	19	9	11	6	26
South Carolina	....	....	9	9	14	8	....	22	10	32	....	42	6	....	21	27
Georgia	5	5	1	11	14	10	13	37	....	12	7	19	4	19	10	33
Florida	5	15	....	20	1	40	....	41	2	20	1	23	....	16	....	16
Ohio	43	21	....	64	11	9	....	20	7	3	1	11	3	2	....	5
Indiana	30	18	1	49	17	12	3	32	8	6	1	15	2	1	1	4
Illinois	21	10	1	32	15	23	1	39	10	13	1	24	5	....	....	5
Michigan	32	52	1	85	3	3	1	7	2	3	....	5	1	2	....	3
Wisconsin	30	50	....	80	3	10	1	14	1	2	1	4	1	1	....	2
Minnesota	28	38	1	67	4	13	....	17	3	7	....	10	3	3	....	6
Iowa	35	28	1	64	9	12	....	21	4	7	1	12	1	1	1	3
Missouri	12	1	2	15	16	9	11	36	8	25	3	36	11	1	1	13
North Dakota	....	12	21	33	1	37	....	38	....	25	....	25	....	....	4	4
South Dakota	27	35	2	64	10	18	1	29	2	2	1	5	1	....	1	2
Nebraska	28	14	....	42	20	8	....	28	12	7	1	20	4	6	....	10
Kansas	32	10	2	44	11	13	2	26	11	5	1	17	7	2	4	13
Kentucky	15	28	6	49	11	14	4	29	13	1	3	17	2	1	2	5
Tennessee	8	....	18	26	8	10	7	25	10	17	11	38	10	....	1	11
Alabama	7	13	4	24	11	23	8	42	....	19	6	25	....	7	2	9
Mississippi	20	6	14	40	11	20	6	37	9	4	1	14	6	2	1	9
Louisiana	5	7	12	24	5	15	31	51	3	8	5	16	2	5	2	9
Texas	5	21	7	33	3	26	9	38	....	17	6	23	1	5	....	6
Oklahoma	7	1	10	18	10	12	30	52	7	7	6	20	4	3	3	10
Arkansas	6	5	18	29	23	9	16	48	4	3	6	13	2	1	7	10
Montana	46	16	1	63	14	10	....	24	5	3	....	8	2	3	....	5
Wyoming	46	54	....	100	....	....	....	....	....	....	....	....	....	....	....	....
Colorado	35	19	1	55	20	15	....	35	5	3	....	8	2	....	....	2

TABLE IX.—*Honey: Color*—Continued.

State.	Form and color.															
	White.				Light amber.				Amber.				Dark.			
	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.	Comb.	Extracted.	Bulk or "chunk."	Total.
	P.c.	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*	*P.c.*
New Mexico	13	13	8	34	8	15	8	31	8	17	2	27	6	2	....	8
Arizona	5	24	....	29	....	49	....	49	....	22	....	22	....	....	....	....
Utah	9	75	....	84	1	15	....	16	....	....	....	....	....	....	....	....
Nevada	16	75	....	91	1	5	....	6	2	....	....	2	1	....	....	1
Idaho	31	42	....	73	6	18	....	24	2	....	....	2	1	....	....	1
Washington	14	37	....	51	11	25	2	38	....	8	1	9	....	2	....	2
Oregon	42	11	3	56	6	20	....	26	9	1	6	16	2	....	....	2
California	9	36	2	47	4	38	1	43	1	6	....	7	1	2	....	3
United States	19.0	19.3	4.5	42.8	9.4	15.7	4.4	29.5	5.0	9.2	2.9	17.1	4.5	4.2	1.9	10.6

COLOR OF HONEY.

An inquiry on November 1, 1917, concerning the per cent of surplus honey produced according to color, shows for the United States 42.8 per cent of white honey, 29.5 per cent of light amber, 17.1 per cent of amber, and 10.6 per cent of dark. The details by States are shown in Table IX. The figures of the total per cent of each color, are more accurate than those showing color in detail according to the form of honey produced.

TABLE X.—*Honey: Disposition of crops.*

State.	Usual disposition.					
	Used at home.			Sold to outside markets.		
	1915	1916	1917	1915	1916	1917
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Maine	75	94	97	25	6	3
New Hampshire	.....	83	77	.....	17	23
Vermont	5	78	74	95	22	26
Massachusetts	94	92	84	6	8	16
Rhode Island	100	100	98	.....	.....	2

TABLE X.—*Honey: Disposition of crops*—Continued.

State.	Usual disposition.					
	Used at home.			Sold to outside markets.		
	1915	1916	1917	1915	1916	1917
	Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
Connecticut	83	75	86	17	25	14
New York	45	58	67	55	42	33
New Jersey	96	53	81	4	47	19
Pennsylvania	75	77	76	25	23	24
Delaware	.....	80	85	.....	20	15
Maryland	80	67	78	20	33	22
Virginia	75	80	88	25	20	12
West Virginia	.....	90	90	.....	10	10
North Carolina	51	69	98	49	31	2
South Carolina	98	97	75	2	3	25
Georgia	75	78	77	25	22	23
Florida	42	60	62	58	40	38
Ohio	75	83	82	25	17	18
Indiana	97	91	94	3	9	6
Illinois	59	63	80	41	37	20
Michigan	54	65	68	46	35	32
Wisconsin	58	68	68	42	32	32
Minnesota	55	72	78	45	28	22
Iowa	65	70	87	35	30	13
Missouri	95	82	96	5	18	4
North Dakota	.....	100	100	.....	.....	.....
South Dakota	85	86	86	15	14	14
Nebraska	64	85	85	36	13	15
Kansas	99	84	90	1	16	10
Kentucky	33	57	68	67	43	32
Tennessee	88	82	90	12	18	10
Alabama	55	55	52	45	45	48
Mississippi	71	87	66	29	13	34
Louisiana	35	56	70	65	44	30
Texas	35	55	68	65	45	32
Oklahoma	99	91	91	1	9	9
Arkansas	92	90	93	8	10	7
Montana	67	68	67	33	32	33
Wyoming	6	75	42	94	25	58
Colorado	23	35	45	77	65	55
New Mexico	42	53	41	58	47	59
Arizona	36	52	31	64	48	69
Utah	32	57	43	68	43	57
Nevada	.....	10	33	.....	90	67
Idaho	23	52	34	77	48	66
Washington	54	40	68	46	60	32
Oregon	92	77	56	8	23	44
California	13	14	23	87	86	77
United States	60.8	64.0	71.1	39.2	36.0	28.9

MARKET.

The proportion of the crop consumed at home or sold locally and that shipped to outside markets, not necessarily wholesale, is shown in Table X for the three years 1915, 1916, and 1917. It may be observed that 39.2 per cent was shipped to outside markets in 1915, 36.0 per cent in 1916, and but 28.9 per cent in 1917, the decreasing percentage released for the general market in 1917 being due partly to a moderate crop, which, even if the home consumption remained the same, would require a larger percentage of the crop, and partly to the shortage in the sugar supply, which created a keener home demand for honey. The smaller percentage of the smaller 1917 crop sent to outside markets, if contrasted with the larger percentage retained of the larger crop of 1916, indicates only about 60 per cent as much honey disposed of through the main trade channels.

TABLE XI.—*Value of exports of domestic honey from the United States, 1911–1917.*

Country of destination.	Fiscal year ending June 30—							
	1911	1912	1913	1914	1915	1916	1917	1918, 6 months ending Dec., 1917.
Europe:	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*
Denmark	.....	.....	.....	.....	14,375	8,854	10,615	75,525
France	.....	189	3,326	8,090	2,114	868	20,678	.....
Germany	38,769	134,175	107,069	75,233	10,200	.....	.....	.....
Italy	.....	221	.....	173	2,378	.....	13,483	500,354
Netherlands	5,232	12,835	3,039	11,398	6,991	11,122	2,000	.....
Norway	.....	.....	.....	.....	.....	.....	4,600	.....
Sweden	.....	.....	.....	.....	.....	.....	8,300	.....
United Kingdom:								
England	8,267	27,573	16,369	3,969	51,713	123,931	596,626	625,037
North America: Canada	20,275	23,666	43,276	27,384	14,930	38,398	53,614	36,589
Oceania, Philippine Islands	2,838	3,519	1,701	2,495	2,149	2,635	2,575	2,437
All other	6,268	10,474	7,472	6,927	9,188	66,679	23,648	14,945
Total	81,649	212,652	182,252	135,669	114,038	252,487	736,139	1,254,887

TABLE XII.—*Honey: Imports into United States, fiscal years ending June 30, 1911–1917.*

Country of origin.	1911	1912	1913	1914	1915	1916	1917	1918, 6 months ending Dec., 1917.
VALUES.								
Insular possessions:	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*	*Dollars.*
Hawaii	52,004	35,973	57,450	33,992	35,536	53,163	62,462	104,946
Porto Rico	17,904	42,251	59,721	90,976	94,895	82,272	103,388	219,843
Total value of shipments to United States of honey from insular possessions	69,908	78,224	117,171	124,968	130,431	135,435	165,850	324,789
Foreign countries:								
Mexico	28,420	20,100	27,702	20,443	42,466	10,900	10,986	11,385
Cuba	26,462	30,225	30,720	6,880	61,334	67,959	198,939	70,374
Dominican Republic	272	4,162	2,156	2,980	14,566	7,476	40,182	119,159
Haiti	4,614	5,832	2,457	1,456	2,387	2,413	20,443	15,262
All other	3,174	2,365	5,682	6,906	4,090	8,713	18,767	39,773
Total value of imports of foreign honey into United States	62,942	62,684	68,717	38,665	124,843	97,461	289,317	255,953
Total value of honey from insular possessions and foreign countries	132,850	140,908	185,888	163,633	255,274	232,896	455,167	580,742
QUANTITIES.								
Foreign countries:	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*	*Gallons.*
Mexico	48,171	34,051	46,028	43,227	92,876	29,002	22,462	16,816
Cuba	50,131	54,226	56,899	15,094	164,042	152,971	296,983	56,788
Dominican Republic	634	8,528	4,638	5,304	33,571	18,585	61,156	103,937
Haiti	10,812	16,261	4,384	2,453	7,309	5,067	26,266	15,951
All other	2,805	1,974	4,322	9,001	6,167	15,599	20,783	33,600
Total quantities of foreign honey imported	112,553	115,040	116,271	75,079	303,965	221,224	427,650	227,092
Average value per gallon.....cents	55.9	54.5	59.1	51.5	41.1	44.1	67.7	112.7

EXPORTS AND IMPORTS.

In Table XI is shown the exports of domestic honey from the United States for the past seven fiscal years, ending June

30, 1917, representing in the main in each case the movement of the crop of the preceding year. Unfortunately, the quantities have not been reported in the trade statistics until the present year. That shipped abroad is almost all extracted honey (some comb honey going to Canada). The price for extracted honey of good quality, such as comprises most of this country's exports, ranged in the neighborhood of 9 cents per pound until the fiscal years 1915 and 1916, when it fell to as low as 7 cents. In 1917 it rebounded to the previous figures and above, and this fiscal year (1918) it has reached to above 15 cents per pound. Some impression may be gained from these figures of the quantity of honey exported, ranging probably from one to two million pounds annually up to 1915, between three and four millions in 1916, and six and seven millions in 1917. For the first half of 1918 they are reported at almost eight million pounds. Prior to the outbreak of the great war more than half of the exports were regularly consigned to Germany. In 1914 these exports fell off somewhat, and in 1915, after small shipments, they ceased. In 1915 a very great increase occurred in the shipments to England, and in 1916 they doubled the large shipments of 1915, while for the year ending June 30, 1917, they probably treble the shipments of 1916. Six months of the fiscal year 1918 show shipment values compared with all of 1917 slightly greater for England, and almost fourfold greater to France, while the formerly insignificant shipments to Italy have leaped to a value of over half a million dollars.

The imports of foreign honey into the United States, aggregating prior to the war something over 100,000 gallons annually, principally from Mexico, Cuba, and other West Indian and Central American countries, are shown in Table XII for the years 1911 to 1917, including both values and quantities. Mexico was our principal source of supply until 1914, with Cuba a close second, but in 1915, while the Mexican supply increased somewhat, the Cuban supply, having its European outlet closed, more than doubled any previous year. In 1916 the Mexican shipments fell off very markedly, while those from Cuba and other countries to the south continued to increase, and in 1917 they further increased to a total of 427,650 gallons, almost double that of any previous year except 1915,

the year in which the war first diverted shipments to our shores. These imports reached 227,092 gallons during the first half of 1918, indicating a probable further material increase in the total this year. This imported honey is largely amber and dark types, used hitherto mostly for baking purposes, and usually competes only with similar grades of home-grown honeys. Most of the imports are to New York.

Honey is also imported into the United States from the island possessions of Hawaii and Porto Rico. The Hawaiian imports are partly of a first-class honey, derived from the Algaroba, a leguminous shrub tree similar to the mesquite of the Southwest, and partly from honeydew, and have ranged in value from about $35,000 to $60,000. For the first six months of 1918 (to Dec. 31, 1917) the value increased by two-thirds over the total for 1917, representing the receipt of 1,445,000 pounds of honey. Those of Porto Rico, principally from the guava and guama, both leguminous trees, and of fair quality, have mounted rapidly from a value of $17,904 in 1911, the first year of substantial shipments, to $103,388 in 1917. The value has already reached $219,843 for the first half of 1918, representing almost 2,000,000 pounds of honey.

SUPPLY AND PRICES.

The conditions obtaining years ago in connection with honey production tended to the handling of honey rather on the basis of a seasonal product than as a staple food for use throughout the year.

The bulk of the honey was produced by farmers as a side line, the bees being given little attention and the honey being produced at relatively little expense. The crop was marketed at low prices in the autumn, and stocks were usually exhausted by the late winter. There was little demand and practically no supply during the spring and early summer.

Honey is now handled in a large way as a staple food product, and this has been in part brought about and the industry is being now largely shaped, through the influence of commercial beekeeping, the production of honey as a principal occupation, which calling, while exceedingly ancient, has had a rapid and interesting development during recent years. The fact that bee diseases drive out of

TABLE XIII.—*Honey prices.*

State.	Average September prices per pound paid producers for all grades at local markets.										Average prices per pound for white honey in wholesale lots, 1 ton or over.					
	Comb.					Extracted.					July 1, 1917.		Sept. 1, 1917.		Nov. 1, 1917.	
	1913	1914	1915	1916	1917	1913	1914	1915	1916	1917	Comb.	Ext.	Comb.	Ext.	Comb.	Ext.
	Cts.	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*	*Cts.*
Maine	19	19	20	20	21	13	.....	.....	19	.....	25	20	21	16	22	18
New Hampshire	20	20	20	20	21	20	20	.....	22	.....	20	.....	31	18	23	.....
Vermont	18	18	17	18	20	20	18	16	.....	16	20	.....	18	13	19	14
Massachusetts	18	19	20	19	22	18	23	.....	.....	.....	22	.....	22	20	27	.....
Rhode Island	19	25	.....	.....	.....	.....	25	.....	.....	.....	.....	14	.....	.....	.....	.....
Connecticut	20	20	18	18	23	15	15	16	15	19	22	16	22	17	26	20
New York	14	15	14	15	16	11	14	14	13	12	16	11	16	13	17	14
New Jersey	18	17	15	13	20	16	18	.....	.....	.....	22	20	18	.....	21	16
Pennsylvania	15	16	16	16	18	9	10	11	10	14	19	14	18	14	18	14
Delaware	15	15	15	20	.....	.....	.....	.....	.....	.....	14	14	16	18	13	.....
Maryland	18	19	18	15	16	12	.....	23	.....	.....	18	15	16	10	18	16
Virginia	13	13	13	15	17	13	13	13	16	18	18	21	17	.....	17	18
West Virginia	17	18	18	20	20	14	15	15	15	18	22	16	20	20	20	.....
North Carolina	14	14	13	14	18	14	13	14	14	18	18	17	20	17	19	14
South Carolina	13	12	12	12	15	15	15	14	15	19	15	.....	15	.....	16	.....
Georgia	12	12	12	12	15	13	13	13	12	16	16	15	16	12	19	10
Florida	15	13	13	13	15	.....	9	10	9	10	14	9	15	9	13	10
Ohio	16	15	16	16	18	12	13	14	15	17	17	12	17	12	19	14
Indiana	16	17	18	17	20	17	16	17	15	21	19	14	19	15	20	16
Illinois	15	15	16	16	17	12	14	15	12	14	18	13	17	14	20	14

Michigan	14	14	14	14	17	10	10	10	10	12	15	11	18	13	18	15
Wisconsin	14	14	14	14	16	10	10	10	10	12	14	11	19	12	17	14
Minnesota	15	15	15	15	16	12	14	13	12	14	18	14	17	12	18	13
Iowa	16	14	15	14	17	14	12	12	11	15	16	11	17	13	18	14
Missouri	15	15	15	15	17	13	15	12	12	15	16	12	19	15	20	.....
North Dakota	18	15	15	19	25	14	12	12	12	19	.....	.....	.....	.....	.....	.....
South Dakota	15	15	15	14	18	13	15	14	14	16	20	15	14	12	15	14
Nebraska	15	15	15	16	17	13	12	12	11	13	18	14	15	13	17	15
Kansas	15	15	14	14	17	12	11	11	11	12	16	13	17	14	18	16
Kentucky	14	15	14	16	18	15	14	13	12	15	18	12	17	14	18	16
Tennessee	14	14	13	14	16	15	14	13	15	16	20	17	18	16	18	20
Alabama	11	11	11	11	13	12	12	12	12	13	15	13	16	13	12	12
Mississippi	12	11	11	10	14	10	12	12	12	15	19	19	15	12	13	14
Louisiana	13	.....	13	20	15	12	.....	13	10	11	15	.....	15	.....	15	.....
Texas	12	12	11	10	15	11	10	10	10	12	.....	10	13	12	14	13
Oklahoma	15	16	15	15	20	13	11	12	14	17	20	15	21	12	20	20
Arkansas	12	12	12	12	15	12	11	12	12	15	16	15	15	12	15	12
Montana	13	12	13	12	18	11	10	12	10	15	14	11	16	13	15	14
Wyoming	12	14	12	12	.....	10	10	11	10	.....	12	.....	.....	12	16	13
Colorado	12	12	13	12	15	10	8	7	8	14	12	10	15	13	15	12
New Mexico	12	11	12	12	15	13	10	.....	12	13	14	10	13	11	14	10
Arizona	12	10	13	10	.....	7	9	.....	16	.....	.....	.....	15	10	14	10
Utah	9	11	10	11	12	7	7	7	7	10	.....	.....	12	10	12	12
Nevada	13	.....	14	12	.....	7	.....	7	7	.....	.....	.....	13	12	14	13
Idaho	12	12	11	12	15	8	9	10	10	14	12	8	15	12	14	12
Washington	15	14	13	13	15	11	9	12	10	13	14	.....	15	11	16	11
Oregon	12	12	12	12	15	12	11	9	.....	15	.....	.....	14	13	12	12
California	13	13	11	12	15	9	8	6	7	11	14	12	17	12	14	12
United States	13.8	13.7	13.3	13.7	16.3	11.9	11.2	10.7	11.4	14.2	16.5	13.1	16.5	13.2	17.0	14.0

business the untrained and indifferent beekeeper, who is unable to successfully combat them, opens the field to the man capable of overcoming them, who is usually also a deeper student of the entire subject of bees and of their care and protection, better informed on sources of nectar, dates of flow, etc., and is therefore able to handle the bees with a view to maximum honey production. But as honey becomes a main crop, and its sale the main source of income, closer attention is drawn to cost of production. Modern equipment must be purchased and the product prepared in an attractive manner. The commercial producer is not able to sell his product for less than the actual expense of production and continue in the business, as is the practice with many who produce honey in a desultory way.

The present exceptional demand, due to the shortage of sugar arising from war conditions, has raised the price of honey to a figure unheard of during the present generation and may be expected to result in some increase in beekeeping, although the general high range of prices, which affects all products that the honey producer himself must purchase, to a considerable extent offsets this increase in the price of his own product.

If the importance of honey as a food, particularly valuable to children and to those with delicate digestions in lieu of the less readily digestible sugars, candies, and confections, and its high merit for use in preparing savory cakes and other foods, as well as in giving palatability to humble articles of fare, should be properly realized and a demand established at permanently adequate prices, a very great increase in the country's supply of this delicious food product might be realized through the inducement thus afforded to competent persons to engage in honey production on a commercial scale.

The usual prices received by producers at their local markets in the month of September, being the rate for small wholesale lots and including many retail quotations, as reported to the Bureau of Crop Estimates by a list of local dealers, are shown in Table XIII, and are fairly representative of the average range of prices shown by the reports for other months of the year. The small effect upon these

prices of the varying production of honey in different years is noteworthy, as is the sudden increase in the present year, which had its beginning in the latter part of 1916. In connection with these, wholesale figures are also shown, being those quoted by the special list of honey producers, of prices received in 1917 for honey in quantities of 1 ton or over, the extracted in barrels or 5-gallon tin cans and comb in cases of twenty-four 1-pound sections. These last figures probably contain some quotations for quantities of less than 1 ton, but are believed to fairly represent the strictly wholesale prices for delivery at local shipping points. The narrow margin between the former figures, which verge closely upon the average price when sold by producers at retail, and the wholesale price, is striking, reflecting the slowness with which most honey producers, disposing of and often retailing their products in local communities, take note of the prevailing wholesale prices in the main markets, many still adhering to their traditional retail figure when practically the same price might be obtained wholesale for their entire product.

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods.*

State.	Clovers.					
	Alfalfa.		White and Alsike.		Sweet (*Melilotus*).	
	Begin.	End.	Begin.	End.	Begin.	End.
Maine	.....	.....	June 18	Aug. 1	July 20	Aug. 20
New Hampshire	.....	.....	June 15	July 20	.....	.....
Vermont	.....	.....	June 13	July 16	.....	.....
Massachusetts	.....	.....	June 10	July 15	July 10	Aug. 25
Rhode Island	.....	.....	June 10	July 18	.....	.....
Connecticut	.....	.....	June 7	July 8	July 8	Aug. 25
New York	.....	.....	June 15	July 15	July 12	Aug 21
New Jersey	.....	.....	June 8	July 10	.....	.....
Pennsylvania	.....	.....	June 6	July 15	.....	.....
Delaware	.....	.....	.....	.....	.....	.....
Maryland	.....	.....	May 20	July 5	June 10	Aug. 10
Virginia	.....	.....	May 22	July 1	May 10	Aug. 1
West Virginia	.....	.....	May 20	June 30	.....	.....
North Carolina	.....	.....	May 10	June 30	.....	.....
South Carolina	.....	.....	.....	.....	.....	.....

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and closing of blooming periods*—Continued.

State.	Clovers.					
	Alfalfa.		White and Alsike.		Sweet (*Melilotus*).	
	Begin.	End.	Begin.	End.	Begin.	End.
Georgia						
Florida						
Ohio			May 30	July 14	June 28	Aug. 13
Indiana			May 30	July 10	June 23	Aug. 15
Illinois			May 28	July 10	June 29	Aug. 17
Michigan			June 6	July 14	July 13	Aug. 28
Wisconsin			June 13	July 26	July 24	Sept. 5
Minnesota			June 12	July 18	July 20	Sept. 1
Iowa			June 6	July 15	June 28	Aug. 18
Missouri			May 20	July 1	June 10	July 30
North Dakota						
South Dakota			June 6	July 24	June 26	Aug. 16
Nebraska	June 18	Sept. 1	June 1	Aug. 1	June 26	Aug. 24
Kansas	May 23	Sept. 4	May 18	June 27	June 14	Aug. 10
Kentucky			May 24	July 9	June 8	July 27
Tennessee			May 16	July 3		
Alabama					May 14	July 10
Mississippi			Apr. 15	June 5	May 15	July 10
Louisiana			Apr. 15	June 15		
Texas					May 25	July 25
Oklahoma	May 23	Aug. 29	Apr. 10	June 15	June 2	Aug. 10
Arkansas			May 15	June 25	May 25	July 25
Montana			June 10	July 25	June 15	Aug. 25
Wyoming	June 15	Sept. 1			July 5	Sept. 10
Colorado	June 13	Sept. 1			July 1	Aug. 28
New Mexico					June 18	Sept. 14
Arizona	May 9	Oct. 1			Apr. 1	June 1
Utah	June 28	Sept. 5			July 4	Sept. 7
Nevada	May 20	Oct. 1				
Idaho	June 21	Sept. 6	May 30	Aug. 5	July 16	Sept. 16
Washington	June 16	Sept. 1	June 6	Aug. 21	July 15	Sept. 15
Oregon	June 1	Sept. 15	June 2	Aug. 5	July 10	Sept. 10
California	May 15	Sept. 15				

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Trees.[1]					
	Deciduous fruit trees.[2]		Basswood (linden).		Gums.[3]	
	Begin.	End.	Begin.	End.	Begin.	End.
Maine	June 1	June 15	July 21	Aug. 2	.....	.....
New Hampshire	.....	.....	.....	.....	.....	.....
Vermont	May 15	May 25	July 10	July 24	.....	.....
Massachusetts	May 13	May 30	July 5	July 25	.....	.....
Rhode Island	.....	.....	.....	.....	.....	.....
Connecticut	May 1	June 1	July 10	July 25	.....	.....
New York	May 9	May 25	July 8	July 20	.....	.....
New Jersey	Apr. 26	May 21	.....	.....	.....	.....
Pennsylvania	May 1	May 12	June 30	July 22	.....	.....
Delaware	.....	.....	.....	.....	.....	.....
Maryland	Apr. 20	May 15	June 20	June 30	.....	.....
Virginia	Apr. 13	May 5	June 25	July 5	.....	.....
West Virginia	Apr. 20	May 10	June 20	July 5	.....	.....
North Carolina	.....	.....	July 10	Aug. 1	May 1	May 20
South Carolina	.....	.....	.....	.....	.....	.....
Georgia	Apr. 3	May 5	.....	.....	Apr. 10	May 6
Florida	.....	.....	.....	.....	Mar. 10	Apr. 25
Ohio	Apr. 22	May 9	June 24	July 12	.....	.....
Indiana	Apr. 19	May 12	June 20	July 5	.....	.....
Illinois	Apr. 17	May 10	June 21	July 7	.....	.....
Michigan	May 12	May 28	July 2	July 18	.....	.....
Wisconsin	May 12	May 20	July 8	July 25	.....	.....
Minnesota	.....	.....	July 10	July 25	.....	.....
Iowa	Apr. 29	May 16	July 1	July 15	.....	.....
Missouri	Apr. 10	Apr. 28	June 12	June 28	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....
South Dakota	.....	.....	July 1	July 15	.....	.....
Nebraska	.....	.....	.....	.....	.....	.....
Kansas	Apr. 19	May 9	June 8	June 26	.....	.....
Kentucky	Apr. 12	May 8	June 15	July 1	.....	.....
Tennessee	Apr. 3	Apr. 28	June 13	June 22	.....	.....
Alabama	Apr. 10	May 10	.....	.....	Apr. 9	May 10
Mississippi	.....	.....	.....	.....	Apr. 10	May 5
Louisiana	.....	.....	.....	.....	Mar. 25	Apr. 18
Texas	Apr. 15	Apr. 25	.....	.....	.....	.....

[1] Black mangrove (*Avicennia*), Florida, June 20 to July 25. Cabbage palmetto (*Sabal*), Florida, June 13 to July 15. Saw palmetto (*Serenoa*), Florida, May 10 to June 15. Orange: California, Mar. 22 to May 5; Florida, February to March. Maple: January in south Florida, February in Gulf Coast States, March south of latitude of Maryland and April north of it, and into the first half of May in the northern tier of States.

[2] Principally apple; Georgia, peach, Mar. 1 to Apr. 1.

[3] Tupelo on the Gulf coast blooms in March, and other gums mostly in April.

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Trees.					
	Deciduous fruit trees.		Basswood (linden).		Gums.	
	Begin.	End.	Begin.	End.	Begin.	End.
Oklahoma	Apr. 25	May 5				
Arkansas	Mar. 25	Apr. 5			Apr. 10	Apr. 20
Montana						
Wyoming						
Colorado	Apr. 23	May 12				
New Mexico	Apr. 10	Apr. 28				
Arizona	Mar. 10	Apr. 15				
Utah	Apr. 20	May 10				
Nevada						
Idaho	May 8	May 31				
Washington	Apr. 15	May 15				
Oregon	Apr. 16	June 16				
California	Feb. 21	Apr. 13				

State.	Trees.					
	Holly (*Ilex opaca*).		Black locust (*Robinia*).		Persimmon.	
	Begin.	End.	Begin.	End.	Begin.	End.
Maine						
New Hampshire						
Vermont						
Massachusetts			June 5	June 15		
Rhode Island						
Connecticut						
New York						
New Jersey						
Pennsylvania			May 25	June 4		
Delaware						
Maryland			May 15	May 25		
Virginia			May 5	May 20		
West Virginia			May 2	May 18		
North Carolina	May 1	May 15	May 10	May 20	May 25	June 15
South Carolina	May 1	May 15				
Georgia	May 2	May 16			Apr. 5	Apr. 28
Florida						
Ohio			May 13	May 26		
Indiana			May 15	May 24		
Illinois						

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Trees.					
	Holly (*Ilex opaca*).		Black locust (*Robinia*).		Persimmon.	
	Begin.	End.	Begin.	End.	Begin.	End.
Michigan						
Wisconsin						
Minnesota						
Iowa						
Missouri						
North Dakota						
South Dakota						
Nebraska						
Kansas			May 25	June 10		
Kentucky			May 8	May 22		
Tennessee			May 1	May 15	June 1	June 15
Alabama			Apr. 25	May 10	May 6	May 20
Mississippi	Apr. 25	May 21	Apr. 15	May 1	Apr. 16	Apr. 30
Louisiana	Apr. 5	Apr. 20				
Texas						
Oklahoma			May 5	May 15		
Arkansas					May 20	June 5
Montana						
Wyoming						
Colorado						
New Mexico						
Arizona						
Utah						
Nevada						
Idaho						
Washington						
Oregon						
California	June 30	Aug. 20				

State.	Trees—Continued.				Shrubs.[1]	
	Sourwood (*Oxydendrum*).		Tulip poplar (*Liriodendron*).		Gallberry (*Ilex glabra*).	
	Begin.	End.	Begin.	End.	Begin.	End.
Maine						
New Hampshire						
Vermont						
Massachusetts						
Rhode Island						

[1] Mesquite (*Prosopis*): Texas, first flow Apr. 15 to May 15, second flow June 15 to July 15; New Mexico, single flow May 6 to July 1; Arizona, single flow Apr. 15 to May 18; Nevada, single flow Apr. 20 to June 1. Catsclaw (*Acacia greggii*), Texas, Apr. 20 to May 16. Guajilla (*Havardia*), Texas, Apr. 20 to May 25. Sage (*Ramona*), California, Mar. 1 to July 1 (mostly April, May, and June). Wild buckwheat (*Eriogonum*), California, June 10 to Aug. 1. Gallberry (*Ilex glabra*): Florida, Mar. 25 to May 5; Georgia, Apr. 27 to May 28; North Carolina, May 20 to June 13.

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Trees—Continued.				Shrubs.	
	Sourwood (*Oxydendrum*).		Tulip poplar (*Liriodendron*).		Gallberry (*Ilex glabra*).	
	Begin.	End.	Begin.	End.	Begin.	End.
Connecticut						
New York						
New Jersey			May 10	May 20		
Pennsylvania			May 22	June 6		
Delaware						
Maryland			May 16	May 28		
Virginia	June 23	July 20	May 10	May 20		
West Virginia	June 30	July 25	May 25	June 10		
North Carolina	June 25	July 20	May 20	June 8	May 20	June 13
South Carolina			May 1	May 20		
Georgia	May 25	June 25	Apr. 16	May 10	Apr. 27	May 28
Florida					Mar. 25	May 5
Ohio						
Indiana						
Illinois						
Michigan						
Wisconsin						
Minnesota						
Iowa						
Missouri						
North Dakota						
South Dakota						
Nebraska						
Kansas						
Kentucky			May 15	June 5		
Tennessee	June 25	July 26	May 8	May 28		
Alabama	June 7	June 28	Apr. 18	May 8	Apr 29	May 26
Mississippi			Apr. 18	May 8	Apr. 30	May 25
Louisiana						
Texas						
Oklahoma						
Arkansas						
Montana						
Wyoming						
Colorado						
New Mexico						
Arizona						
Utah						
Nevada						
Idaho						
Washington						
Oregon						
California						

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Shrubs—Contd.		Miscellaneous.[1]			
	Sumac (*Rhus*).		Raspberry (*Rubus strigosus* and other species).		Buckwheat.	
	Begin.	End.	Begin.	End.	Begin.	End.
Maine			June 10	July 5	July 20	Aug. 15
New Hampshire					Aug. 1	Sept. 1
Vermont			June 10	June 25	Aug. 1	Sept. 1
Massachusetts	July 8	Aug. 4	June 10	June 23	Aug. 1	Aug. 25
Rhode Island	July 6	Aug. 1				
Connecticut	July 6	July 29	June 1	June 15	July 20	Aug. 10
New York			May 22	June 6	Aug. 4	Aug. 31
New Jersey			May 20	June 5	Aug. 1	Aug. 21
Pennsylvania	June 19	July 9	June 1	June 25	Aug. 4	Sept. 7
Delaware					Aug. 1	Aug. 25
Maryland			May 20	June 15	Aug. 5	Sept. 5
Virginia	June 19	June 20			Aug. 8	Sept. 8
West Virginia	June 10	July 5	May 15	June 5	Aug. 5	Sept. 1
North Carolina					Aug. 8	Spet. 10
South Carolina						
Georgia						
Florida						
Ohio					Aug. 9	Sept. 10
Indiana					Aug. 2	Sept. 6
Illinois						
Michigan			June 17	July 18	Aug. 9	Sept. 7
Wisconsin			June 1	June 26	July 29	Aug. 31
Minnesota					Aug. 1	Sept. 1
Iowa					Aug. 10	Sept. 5
Missouri						
North Dakota						
South Dakota						
Nebraska						
Kansas	July 1	July 31				
Kentucky					Aug. 5	Sept. 1

[1] Cotton, principally July and August throughout the cotton belt. Horsemint (*Monarda*), Texas, May 10 to June 27. Pennyroyal (*Hedeoma*), Florida, November to February. Partridge pea (*Chamaecrista fasciculata*), Florida, July to September. Spanish needle (*Bidens, Coreopsis*), North Central States, late August to late September. Fire weed or willow herb (*Chamaenerion angustifolium*): Idaho, July 15 to Aug. 30; Michigan, July 15 to Sept. 15; Minnesota, Aug. 15 to Sept. 20; Oregon, July 1 to Oct. 1; Washington, July 1 to Aug. 30; Wisconsin, Aug. 15 to Sept. 20. Dandelion, during May in most Northern and Western States.

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Shrubs—Contd.		Miscellaneous.			
	Sumac (*Rhus*).		Raspberry (*Rubus strigosus* and other species).		Buckwheat.	
	Begin.	End.	Begin.	End.	Begin.	End.
Tennessee						
Alabama						
Mississippi						
Louisiana						
Texas						
Oklahoma						
Arkansas	June 20	July 5				
Montana						
Wyoming						
Colorado						
New Mexico						
Arizona						
Utah						
Nevada						
Idaho						
Washington						
Oregon						
California						

State.	Miscellaneous—Continued.			
	Fall flowers.[1]		Heartsease or heart-weed (*Polygonum persicaria*).	
	Begin.	End.	Begin.	End.
Maine	Aug. 20	Oct. 1		
New Hampshire				
Vermont				
Massachusetts	Aug. 27	Oct. 12		
Rhode Island				
Connecticut	Sept. 3	Sept. 28		
New York	Aug. 27	Sept. 28		
New Jersey	Sept. 1	Oct. 5		
Pennsylvania	Aug. 25	Oct. 4		
Delaware				

[1] Fall flowers, principally goldenrod and aster, former about a week earlier than latter.

TABLE XIV.—*Principal plants furnishing nectar and pollen; average dates of beginning and ending of blooming periods*—Continued.

State.	Miscellaneous—Continued.			
	Fall flowers.		Heartsease or heart-weed (*polygonum persicaria*).	
	Begin.	End.	Begin.	End.
Maryland	Sept. 1	Oct. 15		
Virginia	Sept. 1	Oct. 15		
West Virginia	Sept. 1	Oct. 15		
North Carolina	Sept. 20	Oct. 26		
South Carolina				
Georgia	Aug. 1	Oct. 15		
Florida	Aug. 1	Oct. 31		
Ohio	Aug. 22	Oct. 2	Aug. 1	Sept. 23
Indiana	Aug. 24	Sept. 23	Aug. 17	Sept. 19
Illinois	Aug. 15	Oct. 1	Aug. 10	Sept. 16
Michigan	Aug. 15	Oct. 23		
Wisconsin	Aug. 18	Oct. 23		
Minnesota				
Iowa			Aug. 10	Sept. 11
Missouri			Aug. 20	Sept. 30
North Dakota				
South Dakota			Aug. 1	Sept. 2
Nebraska	Aug. 10	Oct. 10	Aug. 1	Sept. 1
Kansas			Aug. 1	Sept. 15
Kentucky	Sept. 6	Oct. 12	Aug. 1	Oct. 1
Tennessee	Sept. 13	Oct. 17		
Alabama				
Mississippi				
Louisiana	Sept. 20	Nov. 1	Sept. 5	Nov. 1
Texas				
Oklahoma	Sept. 1	Oct. 15		
Arkansas	Sept. 15	Oct. 1		
Montana				
Wyoming				
Colorado	Aug. 1	Sept. 20		
New Mexico	Aug. 16	Oct. 6		
Arizona				
Utah				
Nevada				
Idaho	July 20	Aug. 30		
Washington				
Oregon				
California				

SOURCES OF POLLEN AND NECTAR.

The honeybee derives its supplies from the successive bloom of a great variety of trees, shrubs, and cultivated and wild plants and flowers, of which the family of the Leguminosæ is by far the most important. Many plants that are not sources of surplus honey are of great importance in the economy of the hives, furnishing the necessary supplies of pollen and nectar to enable the colony to increase the number of bees and thus build up its strength in the spring and to carry it through the winter or through periods of light honey flow during the summer. The average dates of bloom of the most important plants in the different States are shown in Table XIV. The dates given are only rough approximations, being merely the averages of the dates reported from the different States, and the bloom may be earlier or later in portions of particular States, especially those of large area or great diversity of climate.

TABLE XV.—*Sources of surplus honey.*

State.	Clovers.				Trees.						
	Alfalfa.	Alsike.	Sweet (*Melilotus*).	White.[1]	Fruit bloom.	Basswood.	Holly (*Ilex opaca*).	Black locust (*Robinia*).	Persimmon.	Sourwood (*Oxydendrum*).	Tulip poplar (*Liriodendron*).
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	.....	6.0	1.0	53.3	0.2	8.0	.....	2.1	.....	.....	.....
New Hampshire	.....	.....	.....	32.0	4.3	.....	.....	.....	.....	.....	.....
Vermont	.....	.....	.....	40.8	.....	8.5	.....	.....	.....	.....	.....
Massachusetts	.....	.5	2.1	25.5	12.3	1.6	.....	.....	.....	.....	.....
Rhode Island	.....	.....	.....	10.0	.....	.....	.....	.....	.....	.....	.....
Connecticut	.....	1.2	.....	20.3	4.4	3.5	.....	1.2	.....	.....	.....
New York	.....	1.6	2.1	30.2	.6	9.9	.....	.2	.....	.....	.....
New Jersey	.....	11.2	1.5	17.3	.....	.....	.....	.8	.....	.....	1.5
Pennsylvania	.....	2.1	.....	13.1	.8	6.7	.....	.....	.....	.....	.....
Delaware	.....	.....	.....	48.0	2.0	2.0	.....	2.0	.....	.....	5.0
Maryland	.....	3.1	1.9	26.0	.8	2.0	.....	4.2	.....	.....	15.6
Virginia	.....	.....	.....	26.7	1.2	3.0	.....	3.4	1.4	12.2	7.8
West Virginia	.....	.....	.....	26.8	1.1	10.7	.....	.7	.....	3.5	10.3
North Carolina	.....	.....	.....	6.0	1.0	5.0	6.0	2.0	1.2	10.0	8.5
South Carolina	.....	.....	.....	2.0	.....	.....	3.0	1.0	3.0	3.0	20.0

[1] Including red and crimson clover.

TABLE XV.—*Sources of surplus honey*—Continued.

State.	Clovers.				Trees.						
	Alfalfa.	Alsike.	Sweet (*Melilotus*).	White.	Fruit bloom.	Basswood.	Holly (*Ilex opaca*).	Black locust (*Robinia*).	Persimmon.	Sourwood (*Oxydendrum*).	Tulip poplar (*Liriodendron*).
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Georgia	.....	.....	.....	2.0	1.0	.....	3.0	.....	1.0	3.0	16.5
Florida	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Ohio	.....	6.0	4.6	44.7	2.4	11.3	.....	1.4	.....	.....	1.0
Indiana	.....	2.9	5.2	37.3	.....	3.0	.....	.7	.....	.....	1.9
Illinois	.....	2.2	10.6	37.0	.7	3.2	.....	.....	.....	.....	.....
Michigan	.....	6.9	.8	32.3	1.0	7.9	.....	.....	.....	.....	.6
Wisconsin	.....	4.9	2.4	44.3	.2	9.0	.....	.....	.....	.....	.....
Minnesota	1.9	2.8	4.4	38.6	.4	12.3	.....	.....	.....	.....	.....
Iowa	.....	2.2	7.4	57.9	.1	7.6	.....	.....	.....	.....	.....
Missouri	.....	.5	8.8	31.6	.3	.5	.....	.1	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	13.5	1.5	37.3	27.7	.....	.....	.....	.....	.....	.....	.....
Nebraska	21.7	2.2	18.9	18.6	.....	2.7	.....	.....	.....	.....	.....
Kansas	37.0	.....	4.5	20.4	1.9	1.2	.....	.7	.....	.....	.....
Kentucky	.....	.....	12.8	26.8	2.0	5.0	.....	5.9	2.0	.....	3.0
Tennessee	.....	1.2	.....	39.3	.....	6.0	.....	5.0	3.0	13.0	8.8
Alabama	.....	.....	30.0	5.0	.....	1.0	1.0	1.0	1.0	3.0	10.0
Mississippi	.....	.....	20.0	10.0	.....	.....	15.0	2.5	1.0	2.0	5.0
Louisiana	.....	.....	.....	8.5	.....	.....	5.0	1.2	2.5	3.3	2.5
Texas	11.2	.....	.7	.....	.....	.....	1.7	.....	.1	.....	.....
Oklahoma	35.0	.....	25.0	.8	.....	.....	.....	2.1	.....	.....	.....
Arkansas	.....	.....	18.9	8.9	.....	3.4	8.0	3.0	3.0	.....	.....
Montana	15.5	3.1	38.5	10.8	.2	.....	.....	.....	.....	.....	.....
Wyoming	36.4	.....	35.0	.....	.....	.....	.....	.....	.....	.....	.....
Colorado	35.2	.....	30.1	.8	.....	.....	.....	.....	.....	.....	.....
New Mexico	62.2	.....	19.3	.....	.....	.....	.....	.....	.....	.....	.....
Arizona	46.7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	50.0	.....	11.7	.....	.....	.....	.....	2.2	.....	.....	.....
Nevada	67.5	.....	5.0	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	31.0	3.9	15.1	1.6	.5	.....	.....	.....	.....	.....	.....
Washington	20.0	.....	13.0	2.0	3.3	.....	.....	.7	.....	.....	.....
Oregon	25.0	11.0	5.0	7.0	7.0	.....	.....	.....	.....	.....	.....
California	29.0	.....	2.2	.....	.....	.....	.3	.....	.....	.....	.....
United States, average	7.7	1.4	6.2	19.6	.6	3.5	1.1	.9	.5	1.6	2.8

TABLE XV.—*Sources of surplus honey*—Continued.

State.	Trees—Continued.		Shrubs.			Berries.		Cultivated plants.		
	Tupelo and other gums (*Nyssa*).	Other.[1]	Gallberry (*Ilex glabra*).	Sumac (*Rhus*).	Other.[2]	Raspberry (*Rubus strigosus* and other species).	Other.	Buckwheat.	Cotton.	Other.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	.....	.....	.....	.....	.....	1.9	.....	3.1	.....	0.6
New Hampshire	.....	.....	.....	0.7	.....	.....	.....	3.5	.....	.....
Vermont	.....	.....	.....	.....	.....	7.2	.....	4.6	.....	.....
Massachusetts	.....	4.5	.....	.8	.....	.5	2.6	9.0	.....	.....
Rhode Island	.....	.....	.....	25.0	.....	.....	.....	5.0	.....	.....
Connecticut	.....	3.8	.....	20.4	.....	2.9	1.8	6.0	.....	3.8
New York	.....	.....	.....	.....	0.2	2.1	.....	24.2	.....	.....
New Jersey	.....	.....	.....	.....	.....	2.0	1.2	5.0	.....	1.5
Pennsylvania	.....	.....	.....	.....	.....	2.1	.....	30.9	.....	.....
Delaware	.....	.....	.....	3.0	.....	1.0	.....	5.0	.....	.....
Maryland	.....	.....	.....	3.0	.....	.....	.8	2.5	.....	.....
Virginia	.....	.....	.....	4.1	.3	.3	.....	2.0	.....	.....
West Virginia	.....	.7	.....	4.3	.....	.8	.....	8.5	.....	.....
North Carolina	18.0	.....	20.0	.....	.....	.....	5.0	1.5	2.0	.....
South Carolina	15.0	.....	15.0	.....	.....	.....	2.0	.....	10.0	1.0
Georgia	17.5	1.0	13.2	1.0	5.0	.....	1.5	.....	10.0	2.0
Florida	35.0	40.2	.9	.....	6.0	.....	.....	.....	1.0	.....
Ohio	.....	.....	.....	.....	.....	.1	.....	1.7	.....	.....
Indiana	.....	.....	.....	.....	.4	.....	.....	1.2	.....	.....
Illinois	.....	.....	.....	.....	.....	.....	.....	.3	.....	.....
Michigan	.....	.....	.....	.....	.4	9.7	.....	6.4	.....	.....
Wisconsin	.....	.....	.....	.....	.....	1.4	.....	2.1	.....	.....
Minnesota	.....	.....	.....	.....	.....	.....	.....	1.2	.....	.1
Iowa	.....	.6	.....	.....	.1	.....	.....	1.1	.....	.....
Missouri	1.7	.2	.....	2.0	.....	.....	.....	.....	.....	.....
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	.....	.....	.....	.....	.3	.....	1.5	.9	.....	.....
Nebraska	.....	.3	.....	.....	.....	.....	.....	.3	.....	.....
Kansas	.....	.5	.....	.....	.....	.....	.....	.2	.....	1.4
Kentucky	.....	1.5	.....	.....	.....	.....	.....	.3	.....	.....
Tennessee	.....	1.9	.....	.....	.....	.....	1.0	.8	.....	.....
Alabama	15.0	.....	5.0	.....	2.0	.....	1.0	.....	10.0	.....
Mississippi	10.8	5.0	2.0	.....	.....	.....	6.2	.....	7.0	5.0
Louisiana	15.7	6.3	.....	.....	15.5	.....	.....	.....	6.3	15.0
Texas	.....	5.0	.....	2.2	25.3	.....	1.0	.....	24.5	9.7

[1] Including in Florida 5 per cent black mangrove (*Avicennia*), 15 per cent saw palmetto (*Serenoa*), 8 per cent cabbage palmetto (*Sabal*), and 10 per cent orange. California, 17 per cent orange.

[2] Including mesquite (*Prosopis*), 13 per cent in Texas, 13 per cent in New Mexico, and 43 per cent in Arizona; sage (*Ramona*), 22 per cent in California; catsclaw (*Acacia greggii*), 8 per cent in Texas, 1 per cent in New Mexico and Arizona; guajilla (*Havardia*), 4 per cent in Texas; wild buckwheat (*Eriogonum*), 11.2 per cent in California.

TABLE XV.—*Sources of surplus honey*—Continued.

State.	Trees—Continued.		Shrubs.			Berries.		Cultivated plants.		
	Tupelo and other gums (*Nyssa*).	Other.	Gallberry (*Ilex glabra*).	Sumac (*Rhus*).	Other.	Raspberry (*Rubus strigosus* and other species).	Other.	Buckwheat.	Cotton.	Other.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Oklahoma	.....	.....	.....	.....	.....	.....	.....	.....	15.0	.....
Arkansas	5.0	1.5	.....	.....	3.5	.....	.....	1.5	5.0	3.0
Montana	.....	.....	.....	.....	.5	.....	.....	.....	.....	.....
Wyoming	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Colorado	.....	.....	.....	.....	.....	.....	.....	.....	.....	2.0
New Mexico	.....	.4	.....	.....	3.8	.....	.....	.....	.....	.....
Arizona	.....	.....	.....	.....	43.8	.....	.....	.....	2.9	.....
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Nevada	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Idaho	.....	.....	.....	.....	.7	.....	.....	.....	.....	.....
Washington	.....	3.0	.....	.....	.....	.....	.....	.....	.....	.....
Oregon	.....	1.0	.....	.....	5.0	.....	.....	.....	.....	4.0
California	.....	19.4	.....	.....	34.8	.....	.....	.....	.7	1.5
United States average.	3.1	3.8	1.6	.7	7.4	.6	.6	2.9	4.0	1.7

State.	Miscellaneous.					Blends.			
	Aster.	Goldenrod.	Heartsease or heartweed (*Polygonum persicaria*).	Spanish needle (*Bidens, Coreopsis*).	Other.[1]	Alfalfa and sweet clover.	Mixed clovers.[2]	Clover and basswood.	Other.[3]
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maine	2.3	12.9	.....	.....	1.4	.....	1.6	1.3	3.4
New Hampshire	5.9	13.6	.....	.....	.....	.....	.....	21.0	19.0
Vermont	.....	.3	.....	.....	4.5	.....	11.7	16.3	6.1
Massachusetts	.....	5.5	.....	.....	6.6	.....	.....	3.0	35.5
Rhode Island	5.0	15.0	.....	.....	10.0	.....	.....	.....	30.0
Connecticut	8.0	17.3	.....	.....	5.4	.....	.....	.....	.....
New York	.4	2.1	.4	.....	.3	.....	7.0	11.7	7.9
New Jersey	5.0	4.5	4.2	.....	3.8	.....	11.0	3.5	26.0
Pennsylvania	2.5	11.5	.....	2.5	.....	.....	10.0	4.7	13.1
Delaware	4.0	10.0	.....	.....	5.0	.....	5.0	3.0	5.0

[1] Including horsemint (*Monardo*), 14 per cent in Texas; fireweed (*Chamaenerion angusti, folium*), 1 per cent in Maine, 3 per cent in Minnesota, 22 per cent in Washington, 5 per cent in Oregon, trace in Michigan, Wisconsin, and Idaho; partridge pea (*Chamaecrista fasciculata*), 10 per cent in Georgia, 7 per cent in Florida; wild vetches, 15 per cent in South Carolina.

[2] Principally alsike and white clover, but mostly white and sweet clover in South Dakota, Nebraska, and Kansas.

[3] Including other blends with clover; 3 per cent in New York, 11 per cent in New Jersey, 3 per cent in Pennsylvania, 12 per cent in Maryland, 4 per cent in Virginia, and 20 per cent in North Carolina. Mostly aster and goldenrod.

TABLE XV.—*Sources of surplus honey*—Continued.

State.	Miscellaneous.					Blends.			
	Aster.	Goldenrod.	Heartsease or heartweed (*Polygonum persicaria*).	Spanish needle (*Bidens, Coreopsis*).	Other.	Alfalfa and sweet clover.	Mixed clovers.	Clover and basswood.	Other.
	P. ct.	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*	*P. ct.*
Maryland	4.2	3.1	.....	.....	2.7	.....	10.6	3.0	16.5
Virginia	3.0	1.4	.....	0.7	3.7	.....	.....	3.0	25.8
West Virginia	3.3	2.1	.....	.....	6.5	.....	.....	12.7	8.0
North Carolina	2.7	1.0	.....	.....	2.3	.....	.....	2.0	6.3
South Carolina	1.5	1.5	.....	.....	20.0	.....	.....	.....	2.0
Georgia	1.0	1.0	.....	.....	13.3	.....	.....	.....	6.5
Florida	.....	1.0	.....	.....	10.0	.....	.....	.....	5.9
Ohio	1.2	1.1	0.4	.....	.5	.....	6.6	14.5	2.5
Indiana	6.1	3.4	7.0	.5	5.2	.....	7.0	6.0	12.2
Illinois	2.0	3.7	17.1	7.7	2.7	.....	1.0	5.7	6.1
Michigan	.6	2.9	.4	.....	3.1	.....	7.0	13.5	6.5
Wisconsin	.3	.7	.....	.2	1.9	.....	2.0	25.0	5.6
Minnesota	1.1	4.5	.2	.....	7.5	.....	6.7	16.0	2.3
Iowa	.2	2.6	7.0	4.6	3.4	.....	.....	3.5	1.7
Missouri	.3	2.4	7.5	13.7	4.5	.....	.....	10.0	15.9
North Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....
South Dakota	.....	.6	.....	.....	4.4	.....	12.3	.....	.....
Nebraska	1.4	5.2	11.2	.3	3.1	.....	9.0	.....	5.1
Kansas	.....	1.8	8.3	.....	12.6	.....	5.0	.....	4.5
Kentucky	10.0	5.8	2.3	.....	11.6	.....	3.0	.....	4.0
Tennessee	6.7	1.5	.....	.....	10.3	.....	.....	.....	1.5
Alabama	1.0	.....	.....	1.0	8.0	.....	.....	.....	5.0
Mississippi	.....	.....	.....	.....	7.5	.....	.....	.....	1.0
Louisiana	.....	2.0	2.0	.....	5.0	.....	.....	.....	19.2
Texas	.....	.....	.....	.....	18.6	.....	.....	.....	.....
Oklahoma	.....	.....	5.2	4.2	12.7	.....	.....	.....	.....
Arkansas	.....	6.2	2.0	3.5	9.6	.....	.....	.....	14.0
Montana	.3	.3	.....	.....	3.1	27.0	.....	.....	.7
Wyoming	.....	.....	.....	.....	.....	28.6	.....	.....	.....
Colorado	.....	.8	.....	.....	1.1	30.0	.....	.....	.....
New Mexico	.....	2.7	.....	.....	9.1	.....	.....	.....	2.5
Arizona	.....	.....	.....	.....	2.0	.....	.....	.....	4.6
Utah	.....	.....	.....	.....	2.8	25.0	.....	.....	8.3
Nevada	.....	.....	.....	.....	2.5	25.0	.....	.....	.....
Idaho	.....	.6	.....	.....	.2	43.0	.....	.....	3.4
Washington	.....	1.7	.....	.....	26.3	10.0	.....	.....	20.0
Oregon	.....	.....	.....	.....	21.0	12.0	2.0	.....	.....
California	.....	.....	.....	.....	9.1	.....	.....	.....	3.0
United States, average	1.4	2.1	2.0	1.3	7.6	1.4	2.0	4.0	5.9

NECTAR SOURCES FOR SURPLUS HONEY.

The principal sources of surplus honey, that is, honey which is removed from the hive by the beekeeper for his own disposition, in contradistinction to that consumed by the bees, are shown in Table XV.

It is to be observed that the clovers, including alfalfa and sweet clover, belonging to the great family of the Leguminosæ, are the most important source of the country's honey, these alone furnishing 34.9 per cent of the entire supply, besides the larger component (probably 8 per cent) of the 13.3 per cent additional of blended, or mixed honey. Of the clovers, the most important is the small, low growing white clover of the lawns and fields, credited with 19.6 per cent of the total supply. Next in importance is alfalfa, furnishing 7.7 per cent, and its near relative, sweet clover, furnishing 6.2 per cent. Alsike, 1.4 per cent, has probably been reported in some cases as white clover, blooming at the same time and producing the same type of honey. Red clover is mentioned occasionally, as in dry seasons when the corolla tubes are short enough for the bees to reach the nectar, its profuse secretion is utilized. This and crimson clover, a source of nectar in a few southeastern States, are included under white clover, as are all reports of clover simply, without further designation, as the honey from all these excepting sweet clover and alfalfa, is almost identical, and in common practice is handled as white clover honey.

Among the trees, the heaviest producer is the basswood, credited with 3.5 per cent pure, and with white clover as a blend amounting to 4.0 per cent additional. The tulip poplar furnishes 2.8 per cent, and the sourwood 1.6 per cent, the last, however, often being given credit for honey actually derived from other sources. The tupelo and other gums, 3.1 per cent, and the holly, 1.1 per cent, are bountiful producers in limited Southern areas. For heavy yields the orange and other citrus trees are notable, and orange honey, 2 per cent, is of importance commercially. No other tree is credited with as much as 1 per cent of the total, although in many sections black locust is important in an occasional season. Among tree shrubs and bushes, the mountain sages, 2.3 per cent,

the mesquite, 2 per cent, wild buckwheat, 1.1 per cent, and catsclaw, 0.8 per cent, are extremely important in the regions of their growth. These are all plants of the semiarid regions. Gallberry, a type of shrub holly, furnishes 1.6 per cent, and sumac 0.7 per cent. Of berries, the wild raspberry is locally important, blackberry and huckleberry being less so.

Of cultivated plants, cotton is most important, furnishing 4.0 per cent of the total supply. Buckwheat is a heavy producer. It contributes 2.9 per cent.

Of the weeds, goldenrod heads the list, producing 2.1 per cent, its growth being very widespread. Heartsease or heartweed, 2 per cent, and Spanish needle, 1.3 per cent, are important in the Central West, and wild aster, 1.4 per cent, has a very wide distribution.

GEOGRAPHICAL DISTRIBUTION AND CHARACTERISTICS OF IMPORTANT HONEYS.

HONEYS OF THE WHITE CLOVER BELT.

The white clover belt, marking the principal range of the wild growth of this lowly but beneficent plant, wherein it invades the grasslands, yielding nitrogen to the soil, food to the grazing stock, nectar to the bee, and beauty to the eye, includes all of the States from Maine southward to Virginia and the Allegheny and Piedmont sections of the southestern States, and all of the territory westward to the beginning of the semiarid plains beyond the one hundredth meridian of west longitude. White clover is also becoming important in some western irrigated sections and in the limestone and alluvial soils of Alabama, Mississippi, and Louisiana. The white clover belt is the most important honey-producing region, because it furnishes not only the leading commercial type, but all told more than half of the total honey crop of the entire country. The limpid whiteness, heavy body, and distinct but delicate and delicious flavor of white clover, worthy of the dainty clustered blossom whose aroma it bears, long ago established it as a standard of excellence. It should not be asserted that this is the best honey, but if it is said of a honey that it is "as good as white clover," it is considered sufficient praise.

The basswood (linden, Linn.) tree, found native in our forests and planted extensively as an ornamental and shade tree, which furnishes a honey of fine quality when well ripened, and of superlative quality in its frequent blend with white clover, grows in much the same region as the latter, except that it does not extend so far to the southward, being found native south of the latitude of Pennsylvania only as a rule at the higher levels and as far south as North Carolina only in the northern coves of the mountains.

Other principal types of honey produced in the white clover belt are, in relative order of total production, as follows:

Buckwheat, a dark honey of rather strong flavor, much esteemed by those familiar with it, but having practically no market as a table honey outside of the buckwheat-growing sections of New York and other Northern States and the Appalachian region.

Goldenrod, from a very widespread plant, a highly flavored honey with a beautiful golden color, rated as one of the finest of fall honeys, but too rich for many who prefer delicate flavors.

Heartsease honey, from the weed, not the violet, of that name, important in the central corn States, and to a lesser extent in the States east. When produced pure, it is a white or light amber honey of handsome appearance, but of a flavor that wins it no favor outside of the area of its production. Where a constituent of mixed honeys and in not too great proportion it is not objectionable, but rather pleasing.

Aster, the almost universal fall honey, obtained from the common roadside wild aster, a strong amber or dark honey rarely used except for cooking.

Spanish needle, a light golden honey with a distinctive flavor, a very good type and considered superior by many, obtained in considerable quantities during late August and throughout September from the heavy growth of this weed in swamps and along the water courses, in much the same territory as heartsease.

Black locust, a very good light honey from the familiar leguminous tree so favorably known as the source of durable fence posts, which, during the month of May and often too

early for bees to obtain full benefit of its bounty, stands a great cluster of fragrant, snowy bloom for from 10 days to a fortnight, said to yield when weather conditions are favorable, though usually only at intervals of several years, a large amount of honey.

Sumac, broadly distributed, an amber or dark product, with a strong and fruity flavor which is tempting to many.

Apple, and other tree fruit bloom, light amber honey of a very fine flavor when well ripened by the bees.

Raspberry, a white and extremely finely flavored honey produced in considerable quantities in northern Michigan, and less freely elsewhere along the northern border, from the wild raspberry, which covers large areas of cut-over timberlands.

Milkweed, highly esteemed and produced in considerable quantities in limited localities in Michigan and other States where this well-known wayside plant grows in abundance.

Blueberry and huckleberry, a dark honey carrying the flavor of the fruit and greatly prized in the favored localities where obtainable.

WESTERN HONEYS.

Alfalfa, the second most important source of honey, known of ancient days as the "best fodder" and rapidly gaining in this country the respect and place due its worth, yields nectar freely in the region of its principal growth, beyond one hundredth meridian of west longitude and throughout the western Mountain and Pacific Coast States. It is occasionally reported as yielding nectar in some eastern sections. This is usually a white honey except in the southwestern tier of States, where it darkens to amber, with a distinctive spicy or minty flavor, but with a tendency to granulate (crystallize and become semisolid). Owing to its high quality and extremely heavy production throughout the western irrigated regions, it is an important honey commercially.

Sweet clover, a native legume and a very close relative of alfalfa, which in the early stages of growth it resembles closely, is of next importance, the honey being similar in appearance, but of a superior flavor, and with a lesser tendency to granulate. The plant grows wild in dense masses

throughout all of the western Mountain and Plateau States and the central and northern plains, along irrigation ditches and in waste lands, wherever moisture is sufficient. It is also common in all of the Central States eastward to the Atlantic coast, bordering the steam and wagon roads, and is an important honey plant in many sections there and in the black lands of Alabama and Mississippi, especially where cultivated as a forage plant.

The mountain sages of California produce a type of honey of much importance commercially and by common consent one of the finest of all in color (white), density, and flavor. The sage honeys possess, in addition to other virtues, the important one of not granulating readily. Honeys from the desert plants other than sage are as a rule good; many are excellent and rarely are they of poor quality.

Orange honey ranks high among the commercial honeys, being produced in large quantities in California, and to a less extent in Florida, Arizona, and a few of the Gulf Coast States. When produced under favorable atmospheric conditions, as a rule, it is of fine appearance, body, and flavor, and is ranked as one of the very best.

Other sources of favored western honeys are few, but among them fireweed, which follows fires on cut-over lands in western Washington and Oregon, as well as in the northern fringe of the Eastern States, is unexcelled. Vine maple is important in Oregon.

California, the leading honey State, owes its preeminence to four principal sources of supply—the alfalfa of the valley sections, the wild sage and the wild buckwheat shrub of the southern hills and mountains, and the citrus groves.

Of the Texas crop, second in importance, roughly two-fifths is produced in south Texas from the wild horsemint and from the mesquite, catsclaw, guajilla, and other desert trees and shrubs, a scant fifth in the western section of the State beyond the Pecos River from alfalfa and desert plants, and most of the remaining two-fifths in the black waxy soil belt and the prairies of central Texas, principally from cotton, though a considerable quantity is from horsemint and some from mesquite. Rattan, huckleberry, and holly supplement cotton and horsemint in the eastern part of the State.

SOUTHEASTERN HONEYS.

Tupelo gum honey is produced in large quantities from the tree of that name in the regions adjoining the east Gulf coast, principally in swampy sections and along the rivers, and while a honey of good flavor and fair color is in demand mainly because of its nongranulating properties for mixing with other honey. Other gum trees also are sources of honey, but, as a rule, the quality is inferior, and yields are not so heavy.

Cotton honey is white and of fair flavor. It is produced freely in portions of the cotton region, particularly in Texas, though in some sections the plant yields little or no secretion, which, incidentally, is extra floral, the sweet secretion appearing on the stem bracts below the flower and upon the under surface of the leaves.

The tulip poplar tree, growing freely throughout the eastern and southeastern United States, often to an immense size, furnishes an abundance of nectar early in the season, often before the colonies of bees are sufficiently built up to take full advantage of it. The honey is of reddish amber tint and of inferior though not unpleasant flavor and is rarely handled commercially except for cooking purposes.

The Southern States produce several honeys of superior flavor which are consumed on the local market and rarely reach general commercial channels. Among these may be mentioned the sourwood of the Southern Appalachians, the gallberry of the South Atlantic and East Gulf coasts, the saw palmetto and mangrove of Florida, holly, persimmon, partridge pea, and titi. (Cliftonia.)

PRODUCTION OF 1917.

The yield of honey for the year just passed has been only fair, 40.3 pounds average, being much below last year's figure of 52.8 pounds, and slightly below the 42.3 pounds of 1915. The coolness of the season in most of the Central and Eastern States, with local droughts, and prior winterkilling of clover over considerable areas, coupled with periods of extreme heat in the Far West, were principally responsible for the relatively disappointing crops realized in 1917 in spite of earnest efforts on the part of beekeepers toward heavy production.

CONDITIONS AND PROSPECTS FOR 1918.

The increase in number of colonies during the season over and above losses is 11.5 per cent, which will allow for an average winter loss without a material reduction of numbers below that of 1917. The condition of colonies at the beginning of winter was reported as 93.2 of normal, only slightly below the high condition of 95.5 in 1916, and in only four States did it fall below 90, although one of these is the important honey-producing State of Texas, where extreme and long-continued conditions of drought reduced the condition to 81.

The supply of honey in the hives on November 1 was generally ample for ordinary winter requirements, but the severe winter in the central and eastern States threatens heavy losses and weak condition of a large proportion of the surviving colonies in the spring of 1918.

The character of the season controls the yield in a broad sense, but a material increase in production of honey over what may otherwise be expected might be realized if beekeepers generally could be aroused to the importance of the subject and would make special effort by giving attention to the bees in the fall and early spring to see that their stores are ample, by feeding if any shortage exists, by protecting them so far as possible from the inclement winds and freezing temperatures of winter and early spring, by supplying ample room in the brood chamber for the expanding brood (not so early, however, as to lead to harm from undue exposure), by giving plenty of space at the proper time for storing surplus, and by the production of extracted honey. This last expedient, besides permitting a marked increase in production by most beekeepers and in most seasons over that of comb honey, by lessening the amount of comb building and avoiding heavy swarming during the season of surplus production, also involves much less labor in caring for the bees.

The May 1, 1918, report, received just as this bulletin goes to press, shows that the losses of colonies of bees during the past winter have been, for the United States as a whole, 18.7 per cent of the total number; in other words, almost one out of every five colonies has perished. As the reports to the

bureau are in the main from the better class of beekeepers it is to be feared that the wastage has been even greater. Under the present circumstances, this loss assumes an aspect tragic not only to the multitude, almost a million, of industrious and interesting insect communities whose ardent haste and joyous hum have been stilled, but to their human erstwhile beneficiaries. The Nation can ill spare the 20 to 30 million pounds of honey which past experience permits us to assume as the potential production of these lost colonies. Roughly, a third of these losses are ascribed to freezing and another third to starvation, and it is sad to reflect that both of these causes might in large measure have been overcome by their proprietors and protectors. Sugar and labor shortage are partial, but only partial, excuse, as is the unusual winter, which came early, shortening the flow of nectar from the autumn flowers, and persisted with unexampled severity without the customary brief relaxations which in ordinary years permit of late cleansing flights by the hive-bound bees before the settled cold of midwinter.

Lost or failing queens and small colonies resulting from brood diseases or late swarming are as usual the principal other reported causes of loss.

The losses were most severe in the North Central and Northeastern States and extending as far southward as North Carolina, Tennessee, Missouri, and Kansas, ranging in some States as high as 41 per cent and in only a few cases falling below 15 per cent. The losses in the South and West have been less than usual, with the exception of Oklahoma and California, and notably Texas, in which State drought of two-year duration in important honey-producing sections created conditions that resulted last winter in 24 per cent of loss. This drought was happily ended by copious rains early in May.

The number of working colonies remaining on May 1 is estimated at 88.7 per cent of the number on May 1, 1917. Material increases last year partly offset the heavy losses. Increases are shown over last year's numbers in most of the Southern and Western States.

The condition of colonies is 86.4 per cent of a normal at this date, compared with 91.1 per cent last year and an

average of 94.2 per cent, reflecting the bad effect upon the surviving colonies of the severe winter. The colonies appear to be building up rapidly, however. Colonies are reported in excellent condition in most Southern States, excepting Texas, and are above normal in several of the western group, although in California they are in only a trifle better than last year's poor condition, and still 10 per cent below the average.

The condition of honey plants is reported at 86.7 per cent, which is considerably better than the 82.3 per cent reported last spring, but distinctly below the average of 92.6 per cent. The lowest conditions are in Wisconsin, Iowa, and South Dakota, owing to winter killing of clover, and in Texas and Oklahoma, resulting from droughts.

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